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Stephen Weston

Wernería;

OR,

SHORT CHARACTERS

OF

EARTHS:

WITH

Notes according to the Improvements

OF

KLAPROTH, VAUQUELIN, AND HAUY.

By TERRÆ FILIUS.

Beena 'l ma, wa 'l teen.—ARABIC PROVERB.

Inter aquam et lutum, (nondum creatus mundus.)

London:

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PREFACE.

THE design of the writer, in publishing this small Tract on Earths, is to facilitate the knowledge of the science, and assist those who are desirous of studying it, with a *step* towards the kingdom of minerals. In doing this, the author makes an experiment which, should it succeed, may probably lead him from the Earths to the Metals, and from the Metals to the Inflammables. A work, like this, requires but little preface or introduction; but it is necessary, perhaps, to state that the descriptions are for the most part Wernerian; and the distribution of the substances into genera and species, according to the arrangement of Born and Babington; and the notes, in conformity with the new analyses of Kirwan, Klaproth, and Vauquelin, and the comments and annotations of De Lisle and Hauy. With the aid of Chemistry, Mineralogy has increased the number of simple substances by the addition of new earths and new metals; and, by enlarging the list of components, has decreased the number of compounded substances.

These improvements have so deranged the ancient systems, that modern discoveries are not to be reconciled with them without preserving ancient errors, and begetting on them new blunders, and recent absurdities. Mineralogy, therefore, or a treatise which shews what it had been, and what it ought to be, has been supplied of late in all its parts by a citizen of Paris, Monsieur Hauy; which, for illustration, investigation, ingenuity, and description, surpasses all the efforts of his predecessors. To analysis we are indebted for the disclosure of earths combined with acids, in which we become acquainted with the chemical character of a substance; and, by an accurate knowledge of the external, its varieties.

The various forms of crystals have served the early and the late mineralogists for elegant distinctions of species. Romé de Lisle, notwithstanding, could never account satisfactorily to himself for the origin of every secondary form, with all the assistance of the imagination in cutting and levelling an integrant solid; and he was inclined to believe that some minerals, like Janus, were double-headed, or that, like the Nile, they concealed their origin from his in-

quiries. Till Hauy came, this matter was in suspense, but he has endeavoured to prove that every mineral has its integrating molecule, and that the same solids cannot be considered as the common parents of families, not essentially the same. Long before the discovery of the French citizen, that all fragments of calcareous crystallizations were constantly rhomboidal, Keir and Bergman had observed the same thing; but without any examination of other substances, such as fluate of lime of which the nucleus is an eight-sided figure, or the sulphuret of zinc that yields a twelve-sided one, or the sulphuret of lead which affords a cube, and so on through all the crystals, from which it is said to be possible to extract a solid common to all the crystallized varieties of each particular substance, provided such extraction be made in lines parallel to the sides first obtained. Thus Hauy found all varieties of calcareous spar to yield, on being broken, fragments rhomboidal, and these farther divisible in directions parallel to the sites of these rhomboids, which he named the primitive form, or integral molecule, although we must not say that the crystal began here, but rather that thus far back it has been traced, and no farther.

It is now to be considered what assistance may be derived from the present state of the science of mineralogy for the classing of its substances. In M. Hauy's work there are four classes, of which the first two are combinations of earths and alkalis with acids, and earths with earths sometimes united with an alkali. Amongst the minerals which, in the common methods, compose the class of stones, there are many which by analysis are found to contain an acid combined with an earth, as the carbonate of lime, the fluate of lime, and the sulfate of barytes, &c. &c. Other substances, such as the emerald, the topaz, the garnet, and the tourmaline, shew earths combined with earths, and sometimes with an alkali. The third class consists of combustible substances not metallic, and the fourth of metals arranged according to their oxidibility and reductibility. This division remedies, to say the least of it, the difficulties of old distributions by its great simplicity, to which no exception can be taken. The changes M. Hauy has made in the species, which in some instances he has circumscribed, in others enlarged, and the new names he has imposed on them will, in a variety of instances, be observed in the notes. Thus the beril and the emerald are made the

same species, and the zeolite is divided into four different ones, and the strahlstein of the Germans into two. The description of the species is all that the writer of this tract has proposed to accomplish; since the variations, had they been all enumerated, would have swelled his work to an inconvenient bulk. A specimen, however, has been given of the varieties of calcareous spar, which will answer the purpose, and shew what might be done, should any one think proper to undertake it. In the mean time, he adds to the list a crystallization of carbonate of lime from Wales, in octohedrons, and dodecahedrons, and their varieties, like the diamond.

The novelty of this work is in the form of the text, which is in verse, and the reason why it has been preferred to prose is, that it may assist the recollection, and serve as an artificial memory for the several characters of the substances. The first histories were written in verse; the oldest compositions of the Arabs were written in verse, and the Scythian and Runic songs are many of them historical. Laws were sung, and called νόμοι; now νόμοι are songs. 'Why,' says Aristotle, 'is the same word νόμοι used for laws

and songs? Is it because men, before they discovered the art of writing, sang their laws, that they might not forget them?' Prob. Sect. 19—28, p. 441, fol. ed. Lugdani. Voltaire, in the Preface to his Edipe, without asking the question, attributes the use of poetry before prose to the intention of aiding the memory. But here it may be observed, that if you can remember poetry better than prose, you can only know this by having tried prose first, and this, I fear, will rob the French poet of his hypothesis. With respect to myself in this case, I have no doubt that I proceed upon safe grounds; and every boy can tell how much easier he gets by heart his Latin grammar in heroic verse, than his Greek in unmeasured prose.

INTRODUCTION.

ALL earths are known for brittle, and for fix'd,
And sparingly in water soluble;
Depriv'd of taste, and smell, communicate
To glass no tinge, and to metallic form
Are inconvertible; and bulk for bulk
Exceed not water more than five to one.

EARTHS.—Earthy substances, which are composed of *earth only*, have sometimes the addition of an alkali. Their specific gravity varies from 4—4 in the jargon to 0—7 in the suber montanum. Many are hard enough to strike fire with steel, whilst some of the asbestoses draw like a thread. Four sorts are electric at their opposite ends by heat: the topaz, the tourmaline, the zeolite, and the prehnite. In this class the colours are brilliant, and prismatic reflexions are thrown out from the inner substance of the bodies. Mica and smaragdite have a false metallic lustre.—The primitive forms exhibit also much variety in many-sided figures, perfectly regular, as

Some than others are more perfect, and hence
The terms of *saline* and *insipid* come.
By nature all are white, and solvent all
In one and t'other acid, nor can e'en
Prussiate of lime, or potash e'er throw down
These once dissolved, like all the metal-tribe,
Save platina alone. The purer earths
At present known are, silex, alumine,
Lime, magnesia, baryt, strontian,
Adamantine, jargon. — —
Of which the six most common are the first.

---

the cube of the zeolite, and the octohedron of the spinelle and the brown garnet, the six sides of the sapphire and the emerald. Five species, the quartz tourmaline, corundrum, emerald of *Lametherie*, dioptase of *Hauy*, and the cubic zeolite, have a rhomboid for their nucleus. Others, as the topaz and mica, have a four-sided prism for their original crystal, according to Hauy.

The presence of potash has been found in many earthy substances. Mr. Hauy thinks, that if all the bodies in this class had been completely analysed, there would be two orders established, one of earthy substances, and the other of substances alkalino terreuses.

ORDER I.—HOMOGENEOUS.

GENUS I.—*Lime.*

THIS earth from carbonate of lime obtained
For various use, by application of
Incessant heat, in form is concrete, or
In powder; in colour white; in taste hot,
Pungent, and caustic; and when in water solved,
Will change the vegetable blue to green:—
When in the concrete state exposed to air,
Cohesion's force is lost; but when the gas

LIME.—Substances that have an acid united with an earth, or an alkali, and sometimes both, are fusible for the most part in the blow pipe, such as sulfate of lime, fluate of lime, sulfate of baryt. Amongst the known *primitive forms*, the rhomb occurs but once, and that is in the carbonate of lime. It is here that crystallization has produced the greatest variety of forms, which assists the student in crystallography more than any other substance.

The essential character of carbonate of lime is its solubility in nitric acid with effervescence, and divisibility into a rhomboid. Its specific gravity is 2—3. It scratches the sulfate of lime, and is scratched itself by the fluate. Its powder, thrown on a red hot coal, produces phosphorescence. It is soluble in about 700 times its weight of water at a common temperature, and in this form changes vegetable blue, like an alkali, to green. Carbonate of lime contains

Of carbo from the atmosphere's absorbed,
Then all its pristine hardness is regain'd.
Add moisture, and to powder it returns,
Shines in the dark, its caloric evolves,
And doubly mild and temperate becomes.
Per se infusible, all others it can fuse;
With borax, and microsmic salt it melts,
And effervesces not. — — —

---

oftentimes impressions of different shells, made of the detritus of the shells themselves. Whole blocks of granular limestone are formed by microscopic shells, which seem to be the grains of the stone, and are in coarse carbonate of lime what lumachelle are in secondary marbles. The detritus of animal exuviæ make limestone, and animal petrifactions are commonly of a calcareous nature; while vegetable ones are generally siliceous. See Hatchet, in the Philosophical Transactions, June 14, 1804.—Although lime be supposed in many instances to be of an animal origin, yet in others it would seem impossible that it should be derived from this source, as in the case of primitive marble, and limestone, and more especially granite. M. Faujas de St. Fond, in one of his geological lectures, read at Paris in the garden of Plants, calculated that the calcareous earth made by all the dead bodies upon the globe would be, in seven years, just enough to build the Pantheon of St. Genevieve.

SPECIES I.—*Pure Lime.*

Pure lime of yellow hue is shapeless found,
Of earthy texture, not far from Baiæ;
And in the upper mountains of Auvergne,
As Monet writes, and learned Falconer tells.

SPECIES II.—*Carbonate of Lime.*

Aerated or mild lime. Carbonate Calcaise. Chaux aërée. See Haüy.

VARIETY I.—*Calcareous Spar.*

Specimen I.

In figure, colour, and transparency,
The individuals vary, each o'er each
They laminated lie, part into rhombs,
And, when diaphanous, shed double light

PURE LIME is of a dull yellowish white colour, and earthy texture, and found at Bath, and in great abundance in the mountains of Auvergne.—See Babington, p. 1. Sp. Grav. 2—3.

CARBONATE OF LIME.—All the varieties of this species effervesce with the stronger acids, and burn into quick lime.

CALCAREOUS SPAR.—The analysis of this spar is acid 34, lime 55, water 11. See Bergman.—The crystalline forms of the carbonate of lime are deter-

On all they cover; with sudden heat they
Grow opaque, and crepitate, yet without
External aid infusible remain,
Tho' in the focus of combustion placed.
Spars such as these are found most commonly
In horizontal beds of mountains, long
Posterior to the first form'd marble, or
The lime-stone hill. — — —

II.

On half transparent quartz pyramidal,
Small crystals decomposing clearly shew
A brush-like semblance at their points extreme.

III.

Sometimes immixed we see calcareous spar
With native bismuth, with grey mispickel,
And baryt's yellow sulfate. — —

IV.

Again with apices protruding, through
Pyramids of crystals secondary,
The crystallized six-sided cones are soon

---

mined by a series of laws, laid down by De Lisle and Hauy, with great accuracy and ingenuity. The following are descriptions of some of the varieties of this interesting class, which is so instructive to the student in crystallography.

urious eyes, in cabinets, and sales,
joy descried. — — —

V.

e crystals delicate, and needle-like,
ing each other at opposing points,
vith white quartz on grey calcareous spar.

VI.

na's cubes must never be forgot,
yet hexedral prisms at either end
off, in colour brownish, with red earth
iginous, in gypsum striated:

VII.

zeolite, and arborescent lead:

VIII.

yellow color'd crystals with brown blende:

IX.

topaz mock from Derby's fruitful mines:

X.

yet prismatic quartz of chlorite hue:

XI.

crystal fasces in calcareous spar,
kupfernickel mixt, and cobalt-ore:

XII.

those to-day half pervious on grey
llite diverging: — — —

XIII.

Nor white and scaly, in confusion group'd
Like heads of cauliflowers:

XIV.

Or yellow bristly filaments, brush-like
On pisolite, or ochry calamine
Irregular, or amethistine mass.

VARIETY II.

Of particular Shapes—Stalactites, Stalagmites, Flos ferri Pisolite, Roestone.

When stalactites are formed, the attraction
Of cohesion, in odd fantastic shapes,
Of singular arrangement, rules and reigns;
And water operates with menstrual force
At various temperatures, and bodies, chang'd
In just proportion as their elements,
By heat or cold new properties acquire.

CALC. SPAR, VAR. II.—Concrete carbonate of lime, called calcareous stalactite, or striated, or fibrous limestone, is fistular, or in pipes or cylinders, or strati-form in layers, which are more or less wavy as they are extended, or in tubercles composed of concentric layers; or coralloid, branching out into white flowers, like snow, with a delicate velvet-like appearance, with projecting contorted branches. The

Snow white, and crystallized, the stalactite
In cones calcareous, hollow and detached;
Or mamillary, and of yellow hue,
Or with ore spathose incrusted, is half
Transparent, or of coral form again
With plumy velvet on its downy face,
Or pea-like spherules of an ashy hue,
In small concentric layers, resembling
The fishes' roe from Ketton's curious soil.

VARIETY III.—*Amorphous.*

If lime-stone, or if marble that we see,
In every case 'tis difficult to say,
And always to pronounce impossible.

---

pisolite is a globulous and egg-shape concretion, sometimes distinct, and sometimes in bunches, which, when broke, has now and then a nucleus of a different substance, covered with calcareous matter, so as to acquire the name and likeness of confectionary comfits, called dragées de Tivoli.

CALC. SPAR, VAR. III.—Carrara marble, used for statues, has a grain like sugar, susceptible of a fine polish. Those marbles, which consist of a variety of colours more or less vivid, are formed of calcareous earths, mixed with a certain proportion of foreign substances, which give them different shades of red, yellow, blue, or black. The snow-

The latter is the hardest, and contains,
On chemical analysis, iron
And alumine in greater * quantities
Than lime-stone, or than chalk, and is
Of course less fit to burn. They both occur
In strata more or less extensive, and
Make no little part of the earth entire.
Remains of ORGANIZED things in these
Of grainy texture, and embodied oft,

---

white carrara contains a slight proportion of quartz and alumine. Its sp. grav. is 2—716.

The black marble of Derbyshire, which becomes white on calcination, has iron in it, and sometimes only bitumen. The white lime-stone, that supports the basaltic columns on the northern coast of Ireland, abounds with fossil remains, and nodules of dark flint. The yellow marbles of Tuscany have black arborizations on their surface. The dendritic appearance on their face is occasioned by manganese.

Common chalk contains,

Acid	42.
Lime	53.
Alumine	2.
Water	3.

according to Kirwan.

The common uses of lime and lime-stone are in building, and as manure in agriculture. Grey com-

* *See Babington*, p. 17.

And like the substances already named,
Part with their acid should a stronger come,
And if calcin'd lose nearly half their weight.
To paint each marble in a single line,
And every variation shadow out,
Of Derby, or of Babycomb, or rich
Italia's rainbow veins, allotting nought
To Egypt, or to Afric's golden dyes,
Would o'er the world itself my verse dilate.

---

pact lime-stone, with petrifactions, mixed with a great deal of sand, makes good mortar. Greyish white granular lime-stone, with dendrites, pulverised, improves meadow and arable lands. Fine grained white is good for statuary and stone-work of all sorts. The marble of *Paros* of the ancients, and *Carrara*, near the coast of Genoa, of the moderns, are the best for the purposes of sculpture, high finishing, and exquisite polish.

White marble is of the number of those bodies that insulate imperfectly, and hold a middle rank between conductors and electrics. All calcareous earth is no more marble than all stalactite is alabaster. The substance called white as alabaster, to which the proverb alludes, is probably compact sulfate of lime. See Hauy, p. 284, vol. ii.—The ancients made statues of alabaster, and tables, in which the holes occasioned by the hollow of a stalactite found in the

But one there is, of iridescent shells
Compos'd, must not be here forgotten quite,
Which owes its brightness to the Nautilus,
Or muscle tribe, whose flaming lights supply
Its vivid fires.

SPECIES III.

Swine-stone, Pierre Puante, Stink-stein.

Swine-stone, when scrap'd or pounded, offensive
Smells from rank petroleum's fossil oil,
And yet the smell is not the same, but more
Like blue john newly broke; and in swine-stone

---

mass, have been stopped with a bit of the same materials, or alabaster.

In carrara marble, selenite or sulfate of lime is found sometimes crystallised.

Parian marble is harder than carrara, has a tinge of yellow, which makes it more like the human body. Carrara, being softer and whiter, will neither admit of so good a polish, or so just a carnation.

SWINE-STONE, when rubbed against a hard body, has a fetid odour, like Harrowgate water, or rotten eggs, or the washing out of a gun; the same smell I have often found on breaking blue john, of which the beautiful Derbyshire vases are made. The smell proceeds from the presence of the sulphur of hydrogene; and, as Dr. Babington has conjectured, not from

Bitumen is not always found, that can
From distillation be obtained : from whence
We safely may conclude the swinish smell,
Most fetid, to some other cause is owed.

SPECIES IV.

Sidero-calcite, Pearl-spar, Spath Perle, Brawnspath.

Of various colours is the pearl-spar ; brown,
Yellow, white, or grey, with shining surface,
And texture laminate, and crystallized
In rhombs, that with strong acids effervesce ;
Grow dark by long exposure to the air,
And heated crepitate, then red become,
Or brown, or black, as manganese or iron
Prevails, which power magnetic oft imparts.

---

petroleum. The ancients have left us some monuments made of this carbonate of lime, impregnated with bitumen.

PEARL-SPAR.—Mr. Hauy places the fer spathique after the chaux carbonatée, which gives it the character of its form, and he has no doubt of the pearl-spar belonging to the same species, and being the first link of the chain, of which the rest is formed by different modifications of the fer spathique. His words are, " Il convenoit de faire partir la chaine entiere du meme point d'attache." P. 183, vol. ii.

Varieties of spar calcareous
Confounded are with sidro-calcite, and
With manganese siliceous, and e'en
With iron spathose, to which they're near allied.

SPECIES V.—*Baryto-calcite.*

Baryto-calcite is in colour dark,
Or grey, transparent in a slight degree;
In form is spherical, or wedge-like, or
Crystallized in prisms quadrangular, and
Of texture striate.

SPECIES VI.—*Muri-calcite.*

In talc imbedded, or in steatite,
Or in chlorite, the muri-calcite's found,
In crystals solitary, or amorphous,
Or of an earthy form, and olive hue.

The analysis of pearl-spar is carbonate of lime 60, oxyde of manganese 35, iron 5—Woulfe. Spec. Gr. 2—39 to 2—83. The most beautiful pearl-spars are those of a reddish white, or pale vermillion, coloured by manganese, from Schemnitz in Hungary.

BARYTO-CALCITE effervesces with acidsi and contains 92 per cent. of carbonate of lime, and eight of carbonate of baryt, according to Vauquelin.

MURI-CALCITE.—The colour of the crystals of muri-calcite is white, or pearl, or red, or brown.

The crystals into rhomboids break, than spar
Calcareous harder, and with acids
Effervesce, if first reduc'd to powder.

VARIETY I.

Compound Spar, Bitter Spath, Chaux Magnesiée.

Crystallised in perfect rhomboids.

VARIETY II.—*Amorphous.*

Indurated or loose.

SPECIES VII.—*Argentine Schiefer Spath.*

Slate spar is red, or grey, or green, or white,
With silver lustre, pellucid, brittle
To excess, but hard, and when in the fire

They are semi-transparent, rough, and shining on the surface, of a laminated texture, and brittle. In red heat they lose nearly half their weight. Sp. Gr. 2—480.

VAR. II.—The analysis is by Klaproth. Carbonate of lime 52, carbonate of magnesia 45, iron and manganese 3.

SCHIEFER SPATH.—The Sp. Gr. is 2—647 of Kirwan. This substance has been considered as a calcareous spar, but its foliated texture, that shews no joints but in one point of view, its pearly lustre, and its brittleness, establish a difference between it and cal-

Turns to a reddish brown, in which we find
Magnesia, with portions small of iron's
Oxyde, and of alumine.

SPECIES VIII.—*Dolomite.*

Th' elastic marble which Sieur Dolomieu
First analyzed, is supersaturate
With acid carbonic, its colour's pure,
And whitest sugar-like, that's thrice refin'd.

---

careous spar, which shews clearly that it is of another sort. It is found at Schwarzenberg in Saxony, and at Konsberg in Norway.

DOLOMITE.—The common dolomite weighs specifically 2—85. It is granular, and foliate, especially when mixed with mica. Its grains are incoherent, and yield to the pressure of the fingers. It is phosphorescent in the dark, on being struck by a hard body; it effervesces slowly with nitric acid. The analysis is by Saussure the younger.

Lime - -	44—29.
Alumine - -	5—86.
Magnesia - -	1—40.
Oxyde of iron -	0—74.
Carbonic acid -	46—
Loss - -	1—71.

SPECIES IX.

Fluate of Lime, Fluor-spath, Fusible, Fluss.

Of diverse colours, and in various shapes,
Of cube, or mass amorphous, fluor's found;
Transparent oft, of sparry texture, hard
And brittle, tho' not with steel igniting,
Yet close of frame, and, as a mirror, e'en
With finest polish may be made to shine.

FLUOR undergoes no change on exposure to the air, and is nearly insoluble in water, and divisible into a regular octohedron. It scratches the carbonate of lime, is phosphorescent, and on being thrown in powder on a hot coal, exhibits a most beautiful blue and green colour; and two pieces rubbed against one another shine in the dark.

The spec. gr. of fluor is 3—09 to3—19. Analysis—of the amorphous acid 28, 5, lime 21, water 1, silex 31, alumine 15, 5, muriatic acid 1, phosphoric acid 1—Pelletier. Of the crystallized, acid 16, lime 57, water 27—Scheele. The colours of fluor imitate the amethyst, the emerald, the sapphire, the topaz, and ruby balai. Scheele first discovered that the basis of the spath fluor was combined with a particular acid, which, among other properties, corrodes glass. The chlorophane, a substance found in Siberia, resembles strongly the fluate of lime in its green light, when placed on a hot coal.

When heated it sends out phosphoric light,
Which on ignition disappears; in form
Of crystal in the fire it crepitates
Without calcining. Fluor it is called,
Because it fuses earthy substances,
Tho' hardly fusible itself: an acid too
It holds with lime united, which it ne'er
Yields but to distillation, and
Sulphuric force. — — —

SPECIES X.

Phosphate of Lime; Apatyt, Werner; *Phospholite*, Kirwan.

At Scheggenwald, and in Estremadure,
Amorphous masses of this mineral
Exist, in shape irregular, texture

Puymann has made a fine use of the corrosion of glass by the fluoric acid, by drawing figures upon a glass on which a thick varnish had been previously laid, and then covering the whole with the fluoric acid, which biting through the outlines of the drawing, left its impression on the glass. The best work of this kind is that which represents Chemistry weeping over the tomb of Scheele, the discoverer of the fluoric acid.

PHOSPHATE OF LIME.—Sp. gr. of apatyt is from 3—098 to 3—218, and is found generally with tin

Laminate, and in strata that extend,
And form whole mountains as they rise.
White are its crystals, green, and blue with prisms
Hexhedral truncated, and surface bright,
And length'ning striæ, less than fluor hard,
With which and tin they're often found. — —

---

and fluor. It dissolves with little effervescence in nitric and muriatic acids; is also decomposed by the sulphuric, but not so readily, because this acid forms an insoluble compound with its lime. The analysis is, acid 34, lime 59, silex 2, fluoric acid 2—5, muriatic 0—5, carbonic 1, iron 1. Pelletier, of the amorphous apatyt, which was not known to exist till of late. Klaproth's analysis of the crystallized contains acid 45, lime 55. The matrix of apatyt has a curious appearance, like lava, and its crystals sometimes have specular volcanic iron accompanying them. It were possible to confound them with hyacinths of compostella, when they take a deep orange colour, although the angular form of this species of quartz is widely different. In the village of Logrosan, in the jurisdiction of Truxillo, in Estremadura, the houses are built with amorphous apatyt.

SPECIES XII.—*Sulfate of Lime.*

Gypsum Selenite. Gips.

Soft is the selenite, and freely bears
Th' impression of the nail, and, when it's pure,
Boils with no acid, save sulphuric, which,
When concentrated by heat, will solve it.

SELENITE.—The spec. gr. of selenite is from 1—870 to 2—320. It is soluble in 500 times its weight of water in common temperature. Its crystals are rhomboidal, and ten sided; its analysis by Bergman is,

Lime.....32.
Sulphuric acid....46.
Water.....22.

Placed on a burning coal it cracks, grows white in an instant, and becomes friable: melts in the blowpipe into a white enamel, which in a few hours falls to powder; unless the tongue of the flame be directed to the edges of the laminæ the fusion will not be effected. The form of the crystals is occasionally a flatted prism diverging from a common center, producing a stellated appearance, like carbonate of strontian, seen on a fragment of a yellow septarium in the Isle of Sheppy in Kent. Selenite is so called from reflecting the moon as in a mirror, or rather from the idea of its being water congealed by

In many parts this limy compound's found,
(And yet no primitive) and owes its birth
At times to dissolution of pyrite,
There, where the carbonate of lime abounds,
On Shotover's known hill. — — —

GENUS II.—STRONTIAN.

Midway 'twixt lime and baryt stands this earth,
And when by calcination 'tis set free
From union with carbonic acid, and
In water solved by heat attemper'd, then
With solution saturate, the power
Possesses, to separate in crystals,
Of form rhomboidal. — — —

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the influence of the moon. It is scratched by the carbonate of lime. Yellow foliated gypsum is used for plastering, and broad foliated, for flooring, from Eisleben. See Karsten's Œconomical Collection, p. 608, and the article Alabaster, p. 618. The ancients confounded the gypseous alabaster with the calcareous. They never guessed that a few drops of acid, let fall upon these two substances, would make them appear so decidedly different.

STRONTIAN.—The earth strontian has only been found hitherto in combination with the carbonic acid at Strontian in Scotland. It is known to be soluble in 200 parts of water at the temperature of 60°.

CARBONATE OF STRONTIAN.

SPECIES I.—*Strontianite.* Kirwan.

In lustre moderate, and whitish green,
Is carbonate of strontian, transparent
In a slight degree, of fracture striate,
Bent and uneven with concretions
Oblong and distinct, not hard, but brittle,
And yielding to the knife. — — —

Its essential character is divisibility en prime rhomboidal of Hauy, and in giving a slight tinge of red to the blue part of the tongue of the flame in the blow-pipe. Klaproth's analysis is,

Strontiane ..... 58.
Sulphuric acid..... 42.

With indications of iron. Sp. gr. 3—5827.

CARBONATE OF STRONTIAN.—Its essential character is its solubility in the nitric acid with effervescence, and a paper dipt in the solution, and burnt, gives a purple light. Analysis by Pelletier,

Strontian..... 62.
Carbonic acid..... 30.
Water..... 8.

Spec. gr. 3—6583. Both the sulfate of barytes, and the sulfate of Strontian, are very near one another in their geometrical character, and the carbonates of these two substances approach close in their mutual

GENUS III.—BARYT.

Schwererde. Germ.

Baryt to water gives the properties
Of lime; with acid muriatic join'd,
Forms salts that crystallize. — — —

SPECIES I.—*Sulfate of Baryt.*

Baroselenite, Schwerspath, Ponderous Spar.

When crystalliz'd becomes transparent, and
Through laminæ pellucid gives the day;
In colour white, or grey, flesh red, or pale,
Ochry, yellow, cracks in the flame like spar

---

inclinations to the regular hexedral form. The carbonate of barytes, taken inwardly, is a poison, from which the carbonate of Strontian is entirely free.

BARYT.—The artificial carbonate of baryt is in form pulverulent, white, pungent, and heavy specifically 4·00. It unites with sulphur into a species of hepar, which has violent effects taken internally.

SULFATE OF BARYTES is harder than carbonate of lime, and softer than fluate. Its crystals are aggregated lengthened octohedrons, with wedge-like summits, or tabular, with four corners bevilled at their angles, and edges of their extremities; or hexedral, with sharp dihedral summits, or rhomboidal. A small bit taken from the blow-pipe, after having

Calcareous, and melts with heat intense
Like cobalt into glass, and if calcin'd
In open fire, in contact with the flame,
It grows phosphoric, and is in darkness
Visible. — — —

---

been there an instant, and applied to the tongue, gives a taste of rotten eggs. It has more than twice the quantity of heavy earth, than sulphuric acid. In sp. gr. it is 4—865 when pure, requiring for its solution 43,000 times its weight in water. It occurs in metallic mines, in veins, and nodules, and makes a part in certain compound-rocks. The Bologna-stone is a variety of sulfate of barytes, and is the first example of phosphorescence being procured by calcination. Carasciolo, about one hundred years ago, thought, from the weight of the Bologna-stone, to have found silver in it, but he discovered nothing but a reddish light, which the calcined stone emitted in the dark. At that time phosphorescence was a rare occurrence; now it would be as strange to find a substance, which could not be made luminous by dissolution, or by calcination. We make no use of sulfate of baryt in the arts. The Chinese, it is said, use chekao in their porcelain, which resembles the Bologna-stone. Analysis of sulfate of baryt, by Withering,

Baryt.....67.
Sulphuric acid ....33—8.

SPECIES II.—*Carbonate of Baryt.*

The carbonate of baryt most commonly
Is found in mass amorphous; but sometimes
In crystals of six sides, with pyramids
Join'd base to base; of faint transparency,
In texture compact, and with diverging
Striæ, in lustre moderate, milk-white,
Or greyish, or with a tinge of yellow,
By no means hard, and yielding to the knife.

CARBONATE OF BARYT, in weak nitric acid, deposits a white substance of a fine colour before its perfect dissolution. It is phosphorescent, and breaks scaly, and wavy, and appears somewhat greasy. It contains,

Carbonic acid..... 20—8.
Baryt..... 78—6.

The crystals of carbonate of baryt are not very common. It is a poison for rats, and is the rat-stone. Journal des Mines, No. 21, p. 36, de Pelletier.

Spec. gr. 4—2919. Found at Anglesark, near Chorley, Lancashire.

SPECIES III.—*Liberstein, Liver-stone.*

This stone, when heated red, emits a smell
Of sulphur, is in texture foliate,
And partly striate. — — —

GENUS IV.—MAGNESIA. *Talkerde.*

Magnesia uncombin'd does not occur;
When free from foreign mixture, it assumes
The form of white insipid powder, and,
As steatite, a chief ingredient
In curious porcelain of finer grain.

LIVER-STONE comes from Konigsberg in Norway, where it served for a matrix of native silver, of which M. Manthey gave M. Hauy a specimen. Its spec. grav. is 2—666. It does not effervesce with acids. Its analysis is, sulfate of baryt 38, silex 33, sulfate of alumine 22, sulfate of lime 7, petroleum 5. Bergman.

THE CALCI-MURITE (Species I.) or magnesia mixed with calcareous earth, and some oxyde of iron, is of the consistence of clay of a blue or olive-green.

THE ARGILLO-MURITE (Species II.)—Carbonate of magnesia, mixed with alumine and oxyde of iron, served the ancients, according to Fabroni, to make bricks so light as to float on water. It is found in Silesia of a greenish and earthy texture, or of a

SPECIES IV.—*Talc.*

of all colours, from yellowish white
ed and green, is found, of scaly, or
laty texture, foliate oft, bright

---

aceous consistence in Italy, where Fabroni dis-
red it to consist of

Magnesia.....	13.
Silex	50.
Alumine	10.
Lime	3.
Oxyde of iron....	0—9.
Water	12.

LICI-MURITE (Species III.)—The martial mu-
c spar of Kirwan is plastic and yellow, Keffekill,
rschaum; 100 pounds contain 50 of silex, with
onate of magnesia and iron. Of this latter sub-
ce the Turkish pipes are made, by boiling it in
and then exposing it to the air. Intense heat
erts it into a white porcelain mass. In Arabic
called buhr azshoogh, spuma maris. Meer-
um.

ENETIAN TALC, of a greenish white, reduced to
der, leaves a polish on the skin, and is used as a
netic. It contains 44 magnesia, silex 50, alu-
6. The difference between lamellar talc and
is, that mica scratches talc, and is elastic, but

With metallic lustre, and unctuous
To the touch, boils not with acids, but is,
When strongly heated, brittle more and more.

SPECIES V.

Lapis Ollaris, Pot-stone, Pierre Ollaire, Topfstein.

Pot-stone, by calcination white, acquires
Its name by turning on the lathe to most
Domestic uses. — — —

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the plates of talc remain in the position in which they are placed or bent. Talc gives a positive electricity to sealing-wax by friction, mica a negative. Talc is found in primitive and secondary soils, and sometimes proceeds from a decomposition of serpentine. The analysis of Venetian talc is from M. Hæpfner.

Pot-stone is of an earthy fracture; the lapis ollaris of Norway is better than the sort from Swisserland. This substance is greasy to the touch, and not susceptible of a high polish. It is found particularly at Como near Milan, and Mount Musate in Italy.

The spec. gr. is 2—872. It consists of magnesia 38, silex 38, alumine 7, iron 5, carbonate of lime 1, and a trace of the fluoric acid. Weigleb.

SPECIES VI.

Steatites, Pierre de Lard, Soap-rock, Speckstein.

If on a steatite you breathe, the smell
Is earthy, but to the tongue adheres not.
In many things like talc, and pot-stone, with
Less of silex and magnesia, and
Of iron still a smaller portion.

SPECIES VII.—*Serpentine.*

This stone is green, or yellow, red, or grey,
With spots, or veins, or clouds, and granular,
Or scaly, of earthy fracture, hard, or brittle;

STEATITE is sometimes crystallized, but generally in masses, or veins, white, yellow, green, or red, soft enough to be scratched by the nail, or hard as serpentine. Spanish chalk is of the variety of talc, called steatite, though less unctuous on the surface than the other varieties of talc; according to Hauy, it communicates to sealing-wax the resinous or negative electricity, and takes a polish. For turning and carved work greyish-white steatites from Bareuth are much used. Spec. grav. of steatite is 2—4 2—7, and it consists of silex 48—42, magnesia 20—84, alumine 14, iron 1, water 16. Klaproth.

SERPENTINE is a mixture of quartz, talc, clay, and iron, and capable of being turned and polished;

But not transparent, nor on its surface
Shining: in heat is red, but fuses not;
In mass amorphous; insulate, unmixed.
From nickel it derives its leek-dark green,
Or paly mountain-hue. — — —

SPECIES VIII.—*Chlorite,*

Terre talqueuse verdâtre. Born.

Found in loose scales, indurated, shapeless,
Or in crystals; green as grass, or to black,
Or brown inclining, effervesces not

---

is oftentimes magnetic, and has been compared for its spots to a serpent. It contains mica, and asbestos at times. The green sort, mixed with white limestone, is verd-antique. Dark green serpentine from Zobliz, in Saxony, is used for turning and carved work. Saxony, Scotland, Italy, and other parts, supply this substance.

Spec. gr. 2—2 6—3. It may be scraped with a knife, is sometimes attracted by the magnet, and the particles of iron are often visible on its surface. It is composed, according to Hauy, of talc, quartz, clay, and iron.

Chlorite.—The crystal of chlorite is a six-sided prism, which perhaps may be seen with a glass. Talc-chlorite is more or less friable, breaks granularly, when fissile, the *feuillets* are commonly curvilinear;

With acids; breath'd on, has an earthy smell,
And melting to a dull black compact slag,
It grows magnetic. — — —

SPECIES IX.—*Asbestos.*

Asbestos is magnesia's carbonate
Combined with silex, effervesces not
With acids, and is hardly fus'd, and yields
Not freely to incision; is brittle,
And breaks in splinters, greasy to the touch;

---

when zographique, that is, proper for the painter, it is called green earth of Verona, by De Lisle. It consists of magnesia, silex, alumine, lime, iron, air, and water. The indurated has more silex and less magnesia.

Asbestos.—The essential character of asbestos is in its filaments, reducible by trituration to a soft fibrous powder. Its specific gravity is about 2—547 in the hard sort; in the flexible 0—9088; in the braided 0—6806; hard enough to cut glass or scratch it, and soft as cotton in some kinds. Feathered alum, and the sulfates of zinc, and iron, are not distinguishable, but by their taste, from asbestos. Silky gypsum is known, by its instantaneous calcination on a hot iron, not to be of this sort, when asbestos is not sensibly altered. The dust of actinolite is hard and dry to the touch, whilst that of asbestos is soft, and gives an idea of paste on feeling it in powder.

Now runs in fibres parallel, now curved,
And now diverging; its colour olive,
Green, or leek, rarely of a yellow hue,
And sometimes green and white. — —

SPECIES X.—*Amianthus.*

Of pale flesh-red, and ochry yellow hue,
Amianthus has been found, with fibres
Not like asbestos rigid, nor e'en so
Hard to fuse; though each resemble t'other,
Nor can they be for certain known apart.

In the Vatican is a winding-sheet of asbestos, or amianthus, full of ashes and half-burnt bones. The ancients spun it into cloth; the moderns make matches of it, that burn very bright. Father Kircher used one for two years without any waste, or impairing it in the smallest degree. The Corsicans mix it with clay, and work it into pots, which are very light, and not so fragile as if all clay, and more insensible to sudden changes of temperature.

Amianthus is of less specific gravity than asbestos. It is said to exist in compressed rhomboidal parallelopepids near Bagneres, of a grey or bluish colour, soft at first, then hardening on exposure to the air. See Rozier, Journal de Physique, No. 26, p. 429.

SPECIES XI.

Suber Montanum, Liege de Montagne, Bergkork.

The mountain cork, when analysed, contains
Magnesia's carbonate, and alumine,
Lime with carbonic acid, flint and calx
Of iron; in texture various, as light
As cork, on water buoyant, spongy too,
Or membranaceous, opake, not hard
Or shining, but of fusion difficult,
Nor effervescing, but by aid of heat.

SPECIES XII.—*Actynolite, Stralstein.*

No acid makes actynolite to boil,
But in white heat it melts to compact glass;

Suber Montanum, mountain cork, or membranaceous asbestos, or amianthus mountain leather, or fossil paper, floats commonly on water. Its specific gravity, when dry, is from 0—68 to 0—99; when wet, from 1—24 to 1—34.

Actynolite, till of late, has been described as schorl. Its crystals are long, prismatic, smooth, or striated, hexedral, or octohedral. The hardness of actynolite is sufficient to scratch glass, and its fracture is transverse and glassy. Spec. gr. 3—3333. Its primitive molecule has not been observed.

Is yellow, green, or brown, with more or less
Transparency. Exceeding brittle are
Its crystals, and when in state amorphous
Actynolite is found, it's rough to touch,
And sometimes very hard. — — —

Actynolite is found in primitive soils, where magnesia prevails. It forms the base of rocks of different kinds. The best comes from Zillerthal in the Tirol, where it is enveloped in white or green mica. It is also found in Dolomie, and in micaceous rocks, and even with the petro-silex. It is both lamellar and acicular, or needle-like.

The difference between actynolite and epidote of Hauy, or thallite of Daubenton, is in the lateral division, sous les angles, of 124d ½ and 55d ½ of the former, and 114d ½ and 65d ½ of the latter. Whilst actynolite melts to an enamel of a greyish white, the epidote turns to a blackish scoria. The epidote of Arendal has been called akanticone by Dandrada, because the substance of it reduced to powder is of the colour of the plume of the goldfinch; whereas the powder of the French epidote is whitish. Akanticone, according to Hauy, is pierre de serin. Whoever made the word akanticone meant that it should represent ἀκανθὶς and κόνις, or the yellow colour of the arendalite, like the acanthis, or the bird in Theocritus, Idyl. 7, 141, which, like the carduelis, gets its name from its food; but, with permission, acanthilite

SPECIES XIII.—*Jade.*

Lapis Nephriticus, Nephrit, Nierestein.

Unctuous, smooth, and of a waxy hue,
Is jade; now white, now blue, now yellow, green,
Transparent half, but when calcin'd opaque.
Once deem'd infusible; when clear, and free
From mixtures foreign, solve it, and you'll find
The carbons of magnesia, and of lime,
With silex, alumine, and iron's oxyde.
Whilst iron was to savage tribes unknown,
This stone was used for weapons of offence.

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perhaps had been better, since cone is but an imperfect representation of conis, and the attempt to put too much into a word is like driving a nail into a lath and plaister wall, where one stroke fixes it, but at two it either grows loose, or recoils. M. Hauy disapproves of names from places, but retains strontian, and yttria, and arragonite. He also reprobates spar, but without discarding feldspar. Felspar, or rock-spar, as spelt by Kirwan, is however very intelligible.

JADE.—Saussure thought jade infusible, but he changed his opinion. Dolomieu and Lelievre have both fused it by the blow-pipe. Some have supposed this substance to belong to the steatites and serpentines, because they were hard and greasy. Jade is

SPECIES XIV.—*Verde di Corsica, Baikalite.*

On Baikal's borders found, Siberian lake,
This stone in colour is an olive-green,
Transparent slightly, shining, unctuous,
Exhibits prisms with sides, or four, or six,
Or eight, and crystals long, from inches two
To ten, and thick from half an inch to four.
The surface smooth, or striated in length
When broken splinters, to acids yields not,
In fire grows red, and melts to dark green glass.

---

good for-turning. Waller placed it with the jasper but nobody followed him. Some have made it a di tinct species, others have called it petro-silex, and variety of feldspar; the verde di corsica is jad tenace of Saussure, containing smaragdite, or gre feldspar of de Lisle. The mineralogists have not y quite made up their minds to what substances jade allied, or which of the four opinions is the right. has been much used as an amulet against the col and the diseases of the kidneys. Mr. C. Hope h two slabs of Verde di Corsica of unrivalled beauty

BAIKALITE.—The specific gravity of baikalite, species of grammalite in Hauy, is (vol. iii. p. 23 2—92 to 3—2. Scratches glass, but quartz w difficulty. It consists of magnesia 30, silex 4 lime 20, oxyde of iron 6. See Kirwan, vol. i. p. 5(

SPECIES XV.

Boracite, Emmerling. *Chaux Boracite*, Born.

Boracic acid, with magnesia
And lime combin'd, is ever to be found
In solitary crystal cubes, whole or
Truncated, with gypsum of reddish hue.
Imbedded, of colour white, or grey, of
Texture laminate, not solvent, but
By aid of fire, and acid menstruum.
Hence they become, like dark brown tourmaline,
Electric, and when calcin'd they lose their
Brightness, and melt with fervent heat.

Boracite.—The spec. gr. of boracite is 2—566. The essential character is its electricity by heat in eight opposite points, two to two. It is hard enough to scratch glass; four of eight parts acquire a glassy electricity, and four a resinous, according to Hauy. The primitive form of boracite is a cube. The analysis of Westrumb gives 68 boracic acid, magnesia 13—50, and lime 11. The analysis of Vauquelin and Smith of Philadelphia, much less lime. It has been supposed that the lime in Westrumb's analysis was in the state of carbonate, by the effervescence which the powder of the boracic crystals occasioned in the nitric acid. They were also opaque, and it is presumed that if transparent ones were used, there

GENUS V.

Argill, Allumine Fr. Thonerde.

'Tis alumine with sulphur; allum forms,
With other acids, deliquescent salts.

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would be no lime at all, this substance being foreign to the true character of boracite. See Hauy, vol. ii. p. 339.

The crystals of this substance are twelve-sided, and when first found were called crystals of cubic quartz, and by the people of Luneburgh, stone cubes. Till they were analysed by Westrumb, and afterwards by Vauquelin, it was only suspected that the boracic acid existed in natural bodies, and not proved: indeed it was a doubt if borax were not an artificial production.

ARGILL.—This earth is never found native in a state of purity quite perfect. It is obtained by precipitation of a solution of sulfate of alumine by pure ammonia, wholly uncombined. The earth thus procured is white, greasy, smooth. Its specific gravity is 2.

SPECIES I.

Carbonate of Argill, Lac Lunæ, Rein. Thonerde.

Snow white in colour, in hardness passing
Chalk, the carbonate of argill's meagre,
But soft to touch, displays crystals minute
To microscopic eyes.

SPECIES II.—*Clay.*

Of silex Clay is form'd, and alumine,
In water softens, and in fire grows hard.
Of iron's oxyde, and magnesia void,
Few clays there are. In hardness and colour

Carbonate of Argill.—Chaux carbonatée pulverulente of Hauy; craie farineuse, farine fossile of Born; lac lunæ by others, which latter name agrees better with the same substance diluted in water, if such names were not repugnant to all propriety in terms.

Clay.—The proportion of alumine and silex varies considerably in clay; the silex is generally predominant in the proportion of four to one. Clays, breathed on, smell earthy, owing to the presence of the oxyde of iron, according to Dortes. Some clays are marbled, and look like wash-balls ready made.

When clays hold only alumine and silex, they resist fusion, but by the addition of iron, they melt

SPECIES V.—*Bole.*

Like lithomarge, bole's soft, and friable,
But of a firmer texture; its colour
Orange, or red, or pink, with mica-green
Immix'd.

SPECIES VI.—*Tripoli, Tripel,* Germ.

The tripoli from Afric comes, yellow,
Red, or grey, hard, and in fracture slaty,

Bole is ochrous clay of Waller, martial of Born, and described as mixed with fer limoneux in Hauy, adhering to the tongue: gives out sparks near the electral conductor, grows red in the fire, and acquires a polar magnetism. Red bole of Armenia, and terra lemnia, and red pencils for drawing, belong to this class. The bole of Armenia was used formerly as an astringent externally and internally, on which it was usual to put a seal; hence the name of sealed earths.

Tripoli contains, according to Haasse, silex—90, alumine—7, iron—3; specific gravity is 1—850.

This substance has been found in other places than Tripoli. In Hauy, p. 467, vol. iv. it is under Quartz Aluminifere Tripoleen. Tripoli is used to polish metals, gems, and the glasses of optical instruments. It is a flinty matter, reduced to fine sand, which has been left by water in sheets or layers of more or less

Or conchoidal, and vitrifies in fire.
The yellow and the grey, when heated much,
Grow red.

SPECIES VII.—*Lepidolite.*

This scaly stone, of texture foliate,
Thin laminæ of silvery white adorn
With pearly lustre; brittle, soft to scratch,
Of grain distinctly concrete, melts before
The blow-pipe, with froth, into enamel.

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thickness; the ferruginous clay with which these particles are mixed has cemented them together. Thermantide and porcelain jaspis, two substances which have been modified by subterraneous heat, though not volcanic, have the characters of tripoli. Born found a tripoli at Weissenberg, near Prague, in Bohemia, unaltered by subterraneous fire, between two layers of arenaceous agglutinated quartz, or grès, from whence he concluded it to have been a decomposition of grès. But the tripoli of this article is that which has undergone the action of water.

LEPIDOLITE.—The specific gravity of lepidolite is 2—816. Its crystals are flatted tetrahedral prisms, glassy, or granularly calcareous, that is, with a granular calcareous substance adhering to them. It consists of silex 54—5, alumine 38—25, some little iron, and air and water, and is found at Rozena in Mora-

SPECIES VIII.—*Sappare, Cyanite.* Werner.

Sappare occurs in masses lamellate,
With deep blue streaks, where spots of silvery white,
And pearly lustre, half transmit the day;
Sometimes, when crystalliz'd, it is compress'd
In tetrahedral prisms, ever brittle,
And somewhat greasy to the touch. — —

---

via. Besides the above ingredients it has four parts in one hundred of potash. It was only in the second analysis of lepidolite that Klaproth found the potash. The discovery of this alkali in leucite, or the white garnet, suggested to him the idea of accounting for the loss in his first examination of lepidolite, by a supposition that the potash had escaped him. It has also been named lilalite, or lilac-stone, from its colour.

SAPPARE.—The sp. gr. of sappare is 3—517. Hardness sufficient now and then to scratch glass. Hauy's name for it is disthene, or two forces, that is of electricity, which it possesses by having an electric power of its own, and acquiring another, a resinous one, by friction. This substance occurs crystallized, but generally in lamellated masses; scratches mica, and sometimes glass. Saper in Persian is buckler, target, or coat of mail; and sebr, beauty, colour. Thus the peridot of Hauy is in Arabic feridet, a pre-

SPECIES IX.—*Mica, Glimmer.*

Transparent, flexible, elastic, of
Every colour found from white to black,
And as its ting'd with red, or brown, or green,
With greater ease 'tis fus'd; and now
In plates hexagonal occurs, or when
Each upon each is heap'd, th' hexedral prisms
Are duly form'd, and mica makes a part
Which *glimmer* Germans call, of primitive,
Or first form'd stones, as granite, gneiss, or trap.

---

cious stone, or a phœnix of the age, and an incomparable chrysolite. 'Had she been true,' says the Moor, 'if heaven would have made me such another world of one entire and perfect chrysolite, I'd not have sold her for it.' Beryl in Persian is belur, which the Romans turned into beryl. Sappare is composed of silex, alumine, magnesia, lime, oxyde of iron in small quantities.

Mica.—Specific gravity is ..... 2—934.
Micarelle black mica ..... 2—980.

Black mica melts at 153 of Wedgwood's pyrometer into a black compact glass, and is much affected by the magnetic bar. See Klaproth's Analysis of Micarelle, and of common Mica, and Vauquelin in Hauy, p. 210, vol. iii.

SPECIES X.—*Hornblende.*

The crystalliz'd, the common, and schistose,
Make hornblendes three; the first basaltic call'd,
In texture laminate, in portions thin,
And semilucid, of hexhedral prisms
And pyramids trihedral, with rhombic
Faces; or of dihedral summits, and
Ten-sided rhombs. The common is opaque,

Basaltic Hornblende is found in lava, basalt, wacken, and granite. Its specific gravity is 3—333; contains silex, alumine, lime, magnesia, and oxyde of iron. The common has less silex, and alumine, but 15 times more magnesia, and 23 to 1 of oxyde of iron, with only half the lime. The schistose is not so heavy as the basaltic, though of more weight than the common.

Hornblende, called by De Lisle opaque rhomboidal schorl, is seldom well defined in its crystals. It scratches glass, but hardly strikes fire with the steel, and has no electricity by friction, or by heat. It abounds in primitive mountains. The French mineralogists, before Hauy, have called hornblendes, and many other minerals, schorls, which made La Grange remark that schorl was the nectarium of the botanists, a name which Linnæus gives to certain parts of flowers, in very different positions.

Of fracture foliate, and when by pin,
Or knife, is scratched, gives greenish streaks.
The schistose hornblende, black, or blue, or green,
Has silky lustre, of texture striate,
And yields a mark of green, inclin'd to grey;
This last when heated gets a reddish tinge,
And melts into a black, and compact glass.

SPECIES XI.—*Basalt.*

Basalt is grey or blue, or black, and, by
The oxydation of its iron, brown;

Resplendent hornblende and schiller-spar are united by Werner, which Hauy entirely disapproves, particularly the latter, that, according to Emmerling, is found in a six-sided prism, incompatible with the laws of decroissement, supposing an oblique prism with a rhombic base to be the integrant molecule of hornblende, or amphibole. Resplendent hornblende exhibits a beautiful metallic lustre of a silver colour in certain positions, which disappears in others. It is not so hard as the other hornblendes, though similar in its fracture.

Basalt.—Specific gravity of basalt is from 2—864 to 3—000. Its origin is not known, whether by fire, or water, or both. It melts at 100 of Wedgwood to a black compact glass, and consists of silex 50, alumine 15, carbonate of lime 8, oxyde of iron 25,

With transverse joints, or joints articulate,
Its fracture splint'ry, its sides columnar,
Vary from three to nine; with certain heat
'Tis known to melt into a compact glass.
Trap, wacken, mullen, kragg, in texture all,
And fusibility, and form, and weight,
From basalt differ, and from toadstone too.

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magnesia 2. See Bergman, a Neptunian. Found on the coast of Antrim. In Upper Lusatia it is used for land-marks, and corner-pillars, and for the reparation of the roads at Fulda. Chrysolite, and zeolite, and hornblende, are found crystallized in it. Rowley-rag in Staffordshire is of this sort. Silex 47, alumine 32, oxyde of iron 20

Bab Fire, according to Zoroaster and Anaxagoras, is the parent of all things, and according to the Mahometans who are Thalesians, water. The moderns say, that by the solvents of fire and water all things have been made. See Ferber's Travels, Preface. The basalt so called, of which the statue of the Nile was made out of a solid block, and placed by Vespasian in the Temple of Peace, is a hornblende. The true basalt is turned to account at a manufactory near Montpellier, where better bottles are made of it than of any other material.

SPECIES XII.—*Calp, Quarry-stone of Dublin.*

Dark blue, with veins of white calcareous spar,
Opaque, and breath'd on has an earthy smell;
Of fracture splint'ry, yielding to the knife,
And showing streaks of white, one half compos'd
Of carbonate of lime, of alumine
The other, of iron, and of silex.
The calp of blueish black is often deck'd
With brilliant crystals of pyrites cub'd,
That shine, like diamonds, on the viceroy's coat.

SPECIES XIII.

Argillaceous Schistus, Plate-Ardoise, Thon Schiefer.

The argillaceous stone with grapholite
And killas lie in beds of vast extent,

Calp.—Lord Harcourt had a set of coat-buttons, of minute brilliant crystals of cubic pyrites on calp, from the county of Dublin's stone-quarry. The matrix of the emerald from Peru is found to be calp, which was supposed to belong to Ireland only. The writer has an emerald in calp.

Argillaceous Schistus.—The graphic argillaceous schistus, good for slate-pencils, is very soft, owing to the quantity of pyritical matter it contains. Its specific gravity is 2—70, and when powdered ef-

Striped, or spotted, mark'd with blue, or green,
Or grey, or reddish purple, with particles
Of little lustre, and faint glimmering;
Of texture slaty, and of laminæ
Compos'd, that straight, or curv'd, or wavy run,
Not hard, and to the steel no sparks afford.

SPECIES XIV.

Novaculite, Pierre à Rasoir, Turkey-hone. Wetzstein.

Novaculite is grey or green, or yellow-pale,
In slaty masses large, not hard enough
To yield a constant fire with steel, nor yet
With acids will it always boil.
'Tis slightly unctuous to the touch, grows hard,
Or melts at certain heats of Wedgwood's scale,
Into enamel full of pores. — —

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fervesces with acids. In the wine-countries it is called ampelite, because it is supposed to kill the worms which feed on the vines.

NOVACULITE consists of two layers, one black and the other yellow, so cemented that you cannot find the joint that separates them. The yellow part is the most compact. It is found in Turkey, and near Liege. Sp. gr. 2—609 to 2—955. It melts at 120 of Wedgwood.

SPECIES XV.

Sulfate of Argill, Native Alum, Sulfate of Alumine.

In soft amorphous mass of greasy feel,
Is native alum found; in filaments
Like hair of silky lustre, yellow, white,
On lava oft incrusted; or dispers'd
Through marshy soils, and sands, or fossil wood;
Or argillaceous schist impregnating,
Or perfectly dissolved: th' astringent taste
When pure betrays it, or the crystal form
Of octohedral proves it to be true.

ALUM is not volatilized by fire, and is crystallized in octohedrons, of single refraction, and sweet astringency to the taste. Vauquelin's analysis is,

Sulfate of alum.....49.
of potash ..... 7.
Water crystallized.....44.

The crystals of alum are found at Tolpha, forty-two miles from Rome, near Civita Vecchia. The artificial ones are also beautifully crystallized in the same form, of eight-sided figures piled one on another in rows. Native alum is solvent in nine times its weight of cold water, and in a quantity of boiling water less than half its weight.

GENUS VI.—*Kieselerde, Silex.*

Silex in purity is never found;
From powder'd quartz it may be got, as from
Its natural form, by nitric acid, which,
E'en every foreign substance will take up,
And leave the silex pure, and undissolved.
Quartz thus digested, tasteless, white, and dry,
And harsh to touch, becomes not plastic,
Though with water mix'd. Fluoric acid
Alone can act on it; but never heat,
Or fire the most intense, when uncombin'd,
Can fuse it. — — —

SILEX (see Dr. Black, in vol. iii. Edinburg
Transact. on Kiesel-sinter) commonly said to be i
soluble in water, dissolves, according to Kirwan, i
1000 times its weight after precipitation from alkali
solutions. It dissolves also in the humid way in si
times its quantity of either of the fixed alkalies, an
in the dry is capable of being combined with them i
any proportion. Many of its compounds are har
transparent, and very bright.

SPECIES I.—*Diamond.*

In hardness, brilliance, and transparency,
The diamond every mineral excels.
Black, yellow, green, blue, brown, or grey, 'tis known,
And colourless in quartzose sand is found
In flat, or rounded grains, sometimes cube-shap'd;
But oft its form eight-sided is, or twelve:
In texture laminous, but fibrous too,
Irregularly so; to solar rays
Expos'd the diamond is phosphoric;
Rubb'd, it emits electric sparks: what gem
But this from rich Golconda's shore, can e'er
To carbone's acid be converted, and
Leave no wreck behind? — —

The Diamond scratches all other minerals. Its specific gravity is 3—521. Its dust is grey or blackish. Its originating molecule is a regular four-sided figure. It is not so heavy as the white sapphire in the proportion of 8 to 7. It is combustible without apparent remainder, and convertible into carbonic acid. The electricity of the rough diamond, and when cut, is positive; that of the rough sapphire-jargon, and quartz in smooth and amorphous pieces, negative.

SPECIES II.—*Sapphire.*

The sapphire's blue, or red, but rarely green;
Its lengthen'd figure shews, join'd base to base,
Hexhedral pyramids; is in fracture
Foliate, but softer than diamond.

SPECIES III.—*Topaz of Brazil.*

The topaz varies in its hue from gold
To orange, thence to yellow, and to white.

Sapphire.—The origin of a sapphire in crystallization is an equilateral triangular prism, not so hard as the diamond in the proportion of 17 to 20, but heavier as has been mentioned. Its refraction, like the diamond's, is single. In the fire the blue goes off. Oxygene gas reduces it to an enamel. According to Klaproth, the analysis of the sapphire is, alumine 98, iron 2. The specific gravity of this substance is 4. The origin of the name of the sapphire is the same as that of sappare from the Persian.

The specific gravity of the Brazil-topaz is 3—536; its hardness 16. It melts per se at 150 of Wedgwood. Borax vitrifies it, and oxygen converts it to enamel. The topazes of the ancients were green stones found in an island of the name situated in the Red Sea, called Topazon, because it was to be looked for in

Its shape a rhomboid, and four-sided prism,
A tetrahedral pyramid concludes.
In fracture like the sapphire foliate,
And e'en of nearly equal weight. — —

SPECIES IV.—*Topaz of Saxony.*

The Saxon's paler still, and not so hard;
Its prisms by tops dihedral terminate;
Grows white by heat, unlike the Brazil-gem
Which reddens in the flame. — — —

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order to be found, that is, because it was not obvious. In Revelations, c. 21, and Exod. 28, we have Topazion. See the commentators on Exod. 28, 17, and Pliny, l. 24, and Dionysius de Situ Orbis.

THE TOPAZ OF SAXONY has 3—564 for its specific gravity, and 14 for its hardness. Its prisms are tetrahedral, rhomboidal terminated by dihedral summits. At 160 of Wedgwood it cracks, and by oxygen gas is converted into an enamel. The analysis is,

Silex ..... 31.
Alumine..... 68.
Loss ..... 1. Vauquelin.

The topaz of a yellow colour, somewhat green, the chrysolife of Saxony in De Lisle, is probably the gem which the lapidaries call chrysolite. See De Lisle, vol. ii. p. 267.

SPECIES V.—*Beryl of Siberia.*

The same, except in colour, as the last;
A pale sea-green inclining to a blue
Pourtrays the beryl of Siberia,
Which far in crystal magnitude outstrips
The Saxon, or Brazilian gems. — —

SPECIES VI.—*Ruby.*

Of rubies there are two varieties,
Spinelle, or balai, the one bright red,
The other rose in hue, but pale; they both
Are laminate, and octohedral both.

The Beryls, or aigues marines, are found in Siberia, where the topazes occur. The size of these gems varies considerably; some are as fine as a thread, whilst others have ten or twelve inches of length, and three inches of thickness. They appear also in some specimens, as if they had been broke in two, and badly mended. The extremities of many are concave, and convex, and the prisms resemble the jointed basalts. These particulars are noted in Patrin's Natural History of the Mines of Siberia, tom. ii. p. 28—29.

Ruby.—The spinelle scratches quartz, and is a regular octahedron in crystallization. The sapphire or telesie of Hauy are still harder. The analysis by

uby of the East is found to be
)phire colour'd red. The greatest heat
hange upon a ruby makes, which nought
)orax, and the microcosmic salt,
use. — — — —

SPECIES VII.—*Emerald, Smaragd.*

:merald in shades oft varying
grass to lighter greens—conchoidal,
breaking like a shell. Its crystals shew
cations of hexhedral prisms, that melt
borax, though fossil alkali can
ly fuse them. — — —

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roth and Bergman varies much. Specific gravity
-311, the hardness 13.

Klaproth's analysis of the spinelle.

Alumine.....76.
Silex.....16.

Vauquelin.

Alumine.....82—17.
Magnesie ..... 8—78.

MERALD.—The hardness of the emerald is 12,
will cut glass.

s refraction is double, and specific gravity 2—775.
emeralds come from Peru in general, but one of
finest which formerly adorned the tiara of

SPECIES VIII.—*Aqua Marine.*

This species includes the emerald,
Siberia's aq. marine, and chrysolite;
Its crystals are the first, and modified
Alike, except the striæ of its length.

Julius II. now in the cabinet of the Jardin des Plantes, must have come from some other quarter, as Julius died in 1513, the very year that Vasco Nunez left Darien to go to the discovery of Peru.

The analysis of the emerald by Vauquelin, and the aigue-marine of Siberia, are

Emerald.	Silex.... 64—50.	68.	*Beril.*	
	Alumine 15.	16.		
	Glycine 14.	13.		
	Lime.... 1—69.	2.		

The original word for emerald is zumrud in the Persian, whence zmaragd, and emerald zumrud.

The Aqua Marine is found in the high mountains of Schlangenberg in Siberia. Its hardness is 11, specific gravity 2—65. It consists of silex 6—4, alumine 2—4, lime 0—8, oxyde of iron 1—½, according to Bindheim.

The ancients speak of emeralds 30 feet long of entire columns, and colossal statues of a single stone; which shews that with them every green was emerald. The emeralds of Peru have been found six inches long and two thick. Their matrix is calp.

SPECIES IX.—*The Common Chrysolite.*

The chrysolite is yellow, green, and mix'd
With brown, when crystallized, hexhedral are
Its prisms, with pyramids of equal form,
But not alike in angles to the quartz.

SPECIES X. XI.—*Hyacinth.*

The hyacinth is red, and brown, and e'en
Found colorless; twelve sides its crystals boast,
Yet all with rhombic face unequal seem.

THE COMMON CHRYSOLITE is not the peridot of Hauy. Its refraction is remarkably double. Its specific gravity is 3—4285.

The peridot of Ceylon, described by Romé de Lisle, was, according to Hauy, a tourmaline of a yellow-green colour, which is electric by heat, and the peridot only by friction. Tourmaline cuts quartz, the peridot only glass. The crystals of the common chrysolite are a six-sided prism; those of the peridot are the modifications of a rectangle parallelopepid.

HYACINTH.—The specific gravity of the hyacinth is 4—385; hardness 12 or 13.

Its refraction is remarkably double. In French it is called zircon, which Hauy does not explain, and only says that all bright stones on being cut, that had any resemblance to the diamond, were so named.

But those, in lava that imbedded lie,
Have tetrahedral prisms with pyramids
Alike in shape, but at their tops cut off.

Zerk, however, in Arabic, is precious stone. The name of hyacinth has been given to the topaz of a yellow saffron-colour. See Duten's Pierres prec. p.62. Hematite quartz also has been named hyacinth of Compostella. The analysis of the jargon or hyacinth by Klaproth is, jargon-earth 70, silex 26, iron 1. Of Vauquelin, the zircone 64—5, silex 32, iron 2. These stones have been found in France, as well as Ceylon. See Faujas, Recherches sus les Volcans eteints de Vivarais, p. 186. The colour of the hyacinth of Vesuvius is a deep brown, or greenish yellow, named volcanic hyacinth, mixed form or idocrase, which means that the jargon, the white hyacinth of Somma, and cross-stone, have sometimes the same figure. The specific gravity of the hyacinth of Vesuvius is 3—409; its hardness 9. Klaproth found it to contain less silex than the idocrase of Siberia in the proportion 33 to 42.

The idocrase, or the white hyacinth of the Somma, of De Lisle, is called, by M. Hauy, meïonite, because the pyramid is lower in this latter substance than in the idocrase, and even than in the harmotome, or cross-stone; and because no allowance of decroissement in the nucleus of the idocrase could have produced this difference. To express all this the name

SPECIES XII.—*Olivin.*

The colour of this stone is yellow-green;
'Tis found in roundish grains in trap;
And in basalt in masses large, sometimes
It takes the crystal form hexagonal,
And imitates the chrysolite, but soon
The nitric acid will detect the cheat.

SPECIES XIII.—*Garnet.*

The garnet's rarely of a yellow hue,
But mostly red, now olive-green, now black;

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is insufficient. The same may be said of pleonaste, and many other of his new terms; such as diallage, difference; anatase, extended in height, for octohedral rectangular Schorl of Count Bournon. Journal de Physique, Mai 1787, p. 386.

THE OLIVIN is the peridot of Hauy, or chrysolite des volcans granuliforme. Its specific gravity is 3—4285; its hardness 9. Klaproth has analysed it, and found, silex 50, magnesia 38—50, oxyde of iron 12. The olivin is not much esteemed, or very saleable, as may be supposed from the saying, that he that has two has one too many.

GARNET.—The specific gravity of the garnet, so called because it resembles the grains of the pome-

With twice six sides its crystals are a rhomb.
Bohemia's garnets are the best; in gneiss,
Or schistose mica found; in argillite
Or granite rarely they occur. The white
Are leucite, or Vesuvian, call'd, and have
Each facets twenty-four, trapeziums nam'd.

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granate, is 3—5; its hardness from 9 to 14. The Bohemian garnets have, silex 40; the orientals 35—75 of Klaproth; the black garnets of Frascati 43, alumine 16, and the Bohemians alumine 28; the orientals, or Syrian, alumine 27—25. The garnet and the hyacinth are both twelve-sided, but the angles of the sides vary. Our garnets were the carbuncles of the ancients, who made cups of them that held a sextarius, or nearly a quart. The white garnet has, silex 54, alumine 24, potash 20. It is fusible in the blow-pipe according to Hauy. The melanite of Klaproth is from Frascati near Rome. The quantities of iron in the several garnets is,

In the Bohemian ..... 16—50.
Syrian ..... 36.
Black..... 16.

Romé de Lisle mentions opaque garnets, that yielded from eight to thirty pounds of iron in a hundred weight, which makes it worth while to break them up for the metal; but what appears singular is, that the iron should only serve for the colouring matter of the transparent garnets, though in so con-

SPECIES XIV.—*Tourmaline.*

Tourmaline's dark brown, and hyacinthine
Red, verges to green, and sometimes blue;
Its glassy prisms have triple sides, or six,
Or nine, that in trihedral summits end;
With heat electric is, and fusible
Per se with intumescence, and is found
In steatite at Zillerthal, and in
Granite rocks at Ceylon. — —

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siderable a quantity as we have seen it to exist in the Syrian or oriental. The white or leucite is found in dull white friable crystals, imbedded in a purplish indurated argillaceous cement, on Vesuvius. —The white or leucite are called amphigene by Hauy, or of double origin, and are divisible parallelly to the sides of a cube, and also to those of a twelve-sided rhomboid. The name need not have been changed.

TOURMALINE.—The hardness of tourmaline is from 9 to 11, and specific gravity from 3—05 to 3—15. At 200 of Farenheit it grows electric by heat, and contains, of silex 40, lime 3, alumine 3—9, oxyde of manganese 2—0, iron 12—50. Tourmalines are a constituent part of primitive rocks, and their crystals have been often called schorls by naturalists, in the description of granites and other rocks. Tour-

SPECIES XV.—*Schorl.*

In quartz and granite schorl is chiefly found;
In colour black, by fire opaque, electric less
Than tourmaline, in figure crystaline
The same. — — — —

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malines are electric at both ends, and scarcely at
in the middle. They may be detached from ro
and other micaceous stones.

SCHORL is much laminated, and has but four lat
joints; in tourmaline the marks of laminæ are
slight. Schorl is not electric by heat, as tourma
is, and melts into black glass; whilst tourmaline f
to a white or grey enamel.

Schorl is called, by Hauy, amphibole, or equivo
or ambiguous. There are, he says, 16 substance
the French mineralogists that go by the name
schorl. La Grange said on this occasion that sc
was like the nectarium of the botanists, a name g
to parts of the flowers, in very different positions
different species. This author's pyroxene is volc
schorl, etranger dans le domaine du feu, melting
difficulty, whilst the amphibole is easily fused.
augite or pellucid is Brochant's term for Hauy's bl
schorl, or pyroxene, to which Hauy objects,
says his term includes the black and opaque cryst
as well as the transparent. Augite is neverthe
the best name. The cross-stone of Morbihan

SPECIES XVI.

Thumerstein, Axinite, Schorl Violet.

our white, but when impregnated
chlorite, green it is, or pearly grey.
face striated, and laminate
ture, with parallelopipids
boidally compress'd; if 'bove redness
d, it swells and foams like zeolite.

---

erre, and Quimper in Brittany, called stauro-
and named granatite, and sometimes a variety
net, and schorl, is in detached compressed six-
prisms, some single, others united transversely,
e, and of a dark brown colour.

UMERSTEIN is hard from 9 to 10, cutting glass;
cific gravity is 3—2133 to 3—2956. Its crys-
nell, when breathed on, like a flint when it is
g fire. Its fracture is ragged and scaly.
proth's analysis is, Silex..... 55
Alumine 26
Lime..... 9
Manganese .. 1
Vauquelin, Silex..... 44
Alumine 18
Lime..... 19
Manganese .. 4

SPECIES XVII.

Schorlite, Schorlartiger Beril, Pycnite.

In oblong masses, or in columns found,
In colour green and white, scarce pervious
To the rays of light; hard to fuse, by heat
Unalter'd. — — — —

Thumerstein is heavier than feld-spar in the proportion of 5 to 4.

The name of Thumerstein, in Kirwan and Brochant, is changed by Hauy into axinite, or fer de hache, because the crystals are disposed to take a form like the edge of an adz near the bottom or lower part of the facet. Thum is in Saxony.

SCHORLITE.—The essential character of schorlite is the six-sided form of its crystals, and its infusibility. It scratches quartz slightly and glass forcibly. Klaproth finds it to contain silex 50, alumine 50; Vauquelin, silex 36—8, alumine 52—6. This substance has 3—530 for its specific gravity, which makes it heavier than beril, which is now considered as an emerald. Klaproth observes that schorlite becomes feld-spar, which Hauy says is impossible, unless an equilateral triangular prism can be changed into an an oblique angular parallelopipid. In this case, all distinction of one substance from another would be vain and useless. Granite may be-

SPECIES XVIII.—*Rubellite.*

Peach-red is rubellite, of crimson dye,
And half admits the day: in fasces bound,
Its prisms hexhedral end in pyramids,
With triple sides rhomboidal, in surface

---

come porphyry, and gneiss granite, allowed; but that an equilateral triangle can be changed into an oblique angled parallelopipid must not be conceded.

RUBELLITE.—The red schorl of Siberia scratches glass, and even quartz, and is in specific gravity 3—048, acquiring electricity by heat at one end positive, and of the other negative. It has been analised by Garin and Pecheur,

Alumine	48
Silex	36
Lime	3—5
Oxyde of manganese	9

By Vauquelin.

Alumine	45—46
Silex	47—27
Lime	1—78
Oxyde of manganese	5—49

Mr. Hauy thinks rubellite nearly allied to the green tourmaline of the Brazils, though the one is infusible in the blow-pipe, and the other melts to a white glass, and their specific gravities are not exactly alike. The pale pink prisms lying in lepidolite

Rough, and texture fibrous; infusible
Per se—resists the force of alkali,
Of borax, and of microcosmic salt,
And when to redness heated grows snow-white.

SPECIES XIX.—*Amethyst.*

Blue violet is more or less intense
In amethystine stones. — — —
The crystal amethyst is found in prisms
And pyramids, with each six sides alike.
Its fracture is conchoidal, but known
To break in splinters, and in fibres coarse.

---

and fat quartz, have been thought by Esbner a
Lenz as varieties of lepidolite itself. But Klapr
is of opinion that they belong to schorlaceous be
the pycnite of Hauy; they are more like, howev
by their hardness, infusibility, and electric proper
and have more resemblance to the substance in t
article.

In Mr. Greville's noble collection of minerals is
royal specimen of rubellite, presented to Mr. Syn
by the King of Ava.

In the British Museum is a very beautiful a
matchless piece, in colour, of the same mineral, o
deep ruby, from Mr. Hatchet's collection.

METHYST is considered by many as a variety
ystal. Its specific gravity is from 2—651

SPECIES XX.—*Quartz.*

The rocky crystal quartz is called, to which
Few colours are denied, and found in all
Primæval rocks, that into crystals shoot
With pyramids of face triangular,

2—657. It is more or less transparent. The colour is seldom uniformly diffused through the stone, sometimes very weak in parts, and strong in others, and in some places it entirely disappears.

QUARTZ.—The specific gravity of quartz is 2—64 to 2—67. It varies in quartz hyalin from 2—5813 to 2—6701; also in agate-quartz, resinous or opaline quartz, and jasper quartz.

It is hard enough to scratch glass, and strike fire with the steel. White bits of this substance rubbed together produce phosphorescence. Its refraction is said to be double.

The substance called aventurine is a quartz, which acquired its name from an accident, *une aventure*. A workman having let fall some brass-filings into a glassy substance in fusion, called the mixture aventurine, and the mineralogists applied the term to the natural substances of which the accident had produced an imitation. Quartz is used for lustres, and vases of various shapes, and cut in facets for jewellery, especially the amethyst, and the water sapphire, or blue crystal. Quartz is distinguishable from glass by

Six-sided, double, with, and now without,
An intermediate prism; splint'ry, brittle,
Of glassy fracture, melts with no acid
But fluoric, yet boils with alkalis;
To heat obdurate proves, and scarce by gas
Of oxygene is softened. — —

---

the nebulæ, or appearance of clouds in its transparency, whereas there are in glass insulated bubbles. Arenaceous quartz mixed with lime is the binding matter in mortar, that cements the stones in a building. Quartz, when struck with the steel, gives fire, (from the union of the steel) in very small particles, with the oxygene of the air.

Quartz agathe molaire of Hauy, opaque petrosilex of Waller, the carious quartz of Daubenton, is a stone with a carious or decomposing aspect, full of inequalities and recesses, very proper for grinding-stones, and much used for this purpose, and brought from Normandy. This sort has been lately procured also from Wales.

Floating quartz is of earthy appearance, like a fine-grained calcareous stone, in tuberous masses, generally white or grey, rough and uneven in its fracture, dry to the touch. In the center of the mass there is often found a nucleus of flint. This substance floats on water with 98 per cent. of silex and two of carbonate of lime. See Spec. II. Argillo-murite.

SPECIES XXI.—*Prase, Prasem.* Germ.

Prase too is crystalliz'd in form of quartz,
Transparent half, splint'ry, in fracture coarse.
In colour brown, and of a yellow-green,
High polish'd like a gem appears. — —

SPECIES XXII.

Elastic Quartz, or flexible Sandstone.

Elastic quartz, or sandstone flexible,
Thin scales of mica cloath with grey, or brown,
But half transparent in a slight degree.
When scrap'd is phosphorescent, unalterable
Per se at high degrees of heat, but fus'd
By alkali: near mines Brazilian
For diamonds fam'd, and in Thuringia found.

Prase.—The colour of prase is an apple-green. Hauy calls it quartz agathe, prase ou chrysoprase. It owes its colour to nickel, according to Klaproth. Its specific gravity is 2—58. See Klaproth in Chrysoprase. Silex 096, oxyde of nickel 0—01, lime 0—008. Found at Rosemutz, in Upper Silesia, in veins of serpentine.

Elastic Quartz.—The spec. gr. of elastic quartz is 2—624 of Kirwan. It fuses with either of the fixed alkalis, and contains, by Klaproth's analysis, silex 0—965, alumine 0—025, oxyde of iron 0—01.

SPECIES XXIII.

Obsidian Iceland Agate, Verre Volcanique.

In gneiss inherent, granite, porphyry,
Is Iceland agate, or volcanic glass.
When thin transparent to a certain point,
But in the mass opaque; of glossy hue,
Breaks like a shell, and to the steel gives fire.

Volcanic Glass is specifically heavy 2—348, according to Bergman. It contains, silex 69, alumine 22. The ancient Peruvians cut and polished the vitreous lava, and made mirrors of it, which have been found in the tombs of the Peruvian monarchs, who were buried with their gold, and silver, and household furniture. In the sepulchre of Hyder Ally was found a large block of chrysolite, now in this country. Dr. Dee, the conjuror, in Charles the Second's time, had a piece of obsidian always on his table, to raise the devil with, or to lay him. This stone was once in Lord Orford's cabinet. See Major Rennel, p. 107, 4to. on the Scythian Tombs. Herodot. Geograph. from Tooke.

The gadolinite discovered at Ytterby, in Sweden, is like, in appearance, to the volcanic glass, but with such decided difference of character that one cannot long mistake the one for the other. The sensation which the gadolinite makes on the magnetized bar, shews that its iron, at least in part, is in a metallic

SPECIES XXIV.—*Calcedony.*

edony, with all its various tribe
nyx, and cornelian, sardonyx,
lritic, mocho, cacholong opaque;
zoned and banded agate, ever new,
ape, and colour multitudinous,
rey or blue, of flesh, or bloody red:
asses uniform, or stalactite,
oidal, round, or mamillated,
e flint in hardness, and in polish too.

. Messieurs Gadolin and Ekeberg found a new
h in this mineral, which is called yttria, from
rby, where it was discovered. M. Vauquelin, on
ysing this earth, found that 10—5 had escaped
ne process, which he attributes to the water, and
nall quantity of carbonic acid in the yttria. He
nd also that this earth resembled, in some points,
glycine, of which he was the first discoverer.

CALCEDONY is an agate quartz, white, or blue.
crystals of the glassy quartz are sometimes cover-
with a crust of agate, or calcedony. This may be
also of hematite, or ochraceous iron mineralized,
of gold, that they are found incrusted with limpid
rtz. Calcedony is sometimes minutely crystal-
d, and sometimes boasts crystals which look as if
y belonged to another matrix. The specific gra-

SPECIES XXV.—*Hyalite, Muller's Glass.*

Hyalite occurs in grains of basalt,
And of trap; in fracture even, and in
Colour white. — — —

SPECIES XXVI.—*Opal.*

Of Opal two varieties are found;
The bright effulgent, and the duller kind,
Both more or less transparent, break like shells,
But strike few sparks with steel. In water when

---

vity of this substance is 2—606. Its analysis, flint 84, alumine 16. The cornelian, or cornelian-sard of a crocus, or orange, of a flesh-red, or blood colour, is an agate quartz. The sardonyx of the ancients was a stone of different colours, in layers, or bands. The cacholong oftentimes encloses the agate quartz, sticks to the tongue, is of a dead white, transparent at the edges, very even in its fracture, and owes its colour probably to a mixture of clay, like what we call kaolin.

MULLER'S GLASS, Sp. gr. 2—110, has, silex 57, alumine 18, lime 15, and a little oxyde of iron, according to Link's analysis.

OPAL is called by Hauy quartz resinite, because it shines like rosin newly broken. The hydrophanous grow transparent by imbibition. See Boyle and Bacon for this word. The specific gravity of the efful-

Immers'd, stones, that pellucid grow, are call'd
Hydrophanous. A yellow argilite
Affords the finer sorts from Hungary,
In clay dendritic on Czernizka's mount.
They yield to alkalis, but hardly fuse
With borax, or with microcosmic salt.

SPECIES XXVII.

Pitch-Stone, Pechstein, Pierre de Poix.

In pitch-stone shades of olive and of green
Prevail, a blood-like red, and yellow brown.
When crystalliz'd hexedral prisms end in

---

gent, or edler, is 2—114, and of the common, 1—985 to 2—076. Analysis of the common opal is, 98—75 flint, alumine 0—01, oxyde of iron 0—01. The colours of the opal owe their beauty to the imperfections of the stone, which admits the light, and reflects it through and from a multitude of cracks and fissures, that form breaks and intervals in its substance.

PITCH-STONE.—Spec. gr. of pitch-stone is from 2—049 to 2—39. It is chiefly silex, with from $\frac{1}{100}$ to $\frac{1}{6}$ of alumine. It has a greasiness which is not on opal, and a brittleness and semi-transparency not in jasper. It has been also of late known to contain ammonia. Davy's Analysis.

Pyramids trihedral. In specimens
There's great variety of parts, but all
Abound in silex most, and alumine:
Some water too, and oxyde e'en of iron
They have, with matter that's inflammable.

SPECIES XXVIII.—*Cat's Eye, l'Œil du Chat.*

Concentric circles round a point of light
Mark, on the cat's eye, forms that shed a white
Or blue effulgence, with bright shifting rays
That come and go; its fracture's foliate,
Now fibrous, now conchoidal; and fuses
Slowly to enamel white. — — —

The Cat's Eye was formerly considered as a variety of feld-spar, but, since Klaproth's analysis, it is found to be almost entirely composed of flint or silex. In different directions its fracture varies. Its specific gravity is 2—5 to 2—66, and contains from 94 to 95 per cent. of silex; the rest is alumine, lime, and oxyde of iron.

SPECIES XXIX.

Flint, Feuerstein, Caillou.

Flint's an amorphous mass, though sometimes found
With triple sides of double pyramids;
Cracks in the fire, grows white, and brittle,
And soft by streams of oxygene, and melts
To glass by alkalis alone. — —

SPECIES XXX.—*Horn-Stone, Chert, Petro-Silex.*

Crystals of rocky silex that you find,
Are p'rhaps mere casts in moulds of fluor-spar,
Or spar calcareous: of coarser grain

FLINT.—The fracture of flint is conchoidal, with very angular fragments. Spec. gr. 2—58 to 2—63. It is sometimes stalactitic, and of a deep red colour, and in Norfolk remarkably dendritic, with beautiful arborisations on its surface, but generally found in chalk-hills.

HORNSTONE.—Spec. grav. 2—6257 to 2—7467. Its transparency, lustre, and hardness, are inferior to those of flint, and, when substituted for it, spoils the pottery by too much vitrifaction. Many instances have occurred of this in Staffordshire of late. It breaks in scales, and on being exposed to a strong light, and moved backwards and forwards, an ap-

Than flint this substance is, and not so hard;
When broke it splinters, and becomes black glass,
By borax fused; three fourths are flint,
With alumine, and carbonate of lime.

SPECIES XXXI.—*Jasper.*

Bright are the jasper's tints, with clouds,
And spots, and diverse stripes, and splendid veins
Of green and various hues; in mass opaque,
But in thin fragments pervious to the light:

---

pearance of scintillation is perceived. Pitch-stone has been called by Emmerling resinous petro-silex, from its breaking with a shining fracture like rosin. Petro-silex may be considered as feld-spar without its laminated texture, and not susceptible of crystallization, and that it holds the same rank with common feld-spar that flint does with quartz, whatsoever be the cause, that in both the substances of silex and petro-silex, may prevent the regular aggregation of their incipient forms. See Hauy, p. 391, vol. iv.

Jasper.—Spec. gr. is 2—58 to 2—7. Analysis, according to Delametherie, is, flint 54, alumine 30, iron 16. In irregular hexhedral prisms it is found crystallized—that is, in secondary crystals, formed on calcareous spar. Jasper quartz is red, green, yellow, lavender blue, violet, and black. White

With earthy fracture angularly sharp,
Less hard than flint, but striking fire with steel.
Jasper in large elliptic masses oft
Occurs, or nodes detached, or rocks entire,
To which Egyptian pebble's near allied.

SPECIES XXXII.

Porcellanite, Porcellan Jaspis.

The porcelaine jasper's not unlike a brick,
That's slightly glaz'd, and on its face presents
An ochre yellow, or an isabel,
In spots distinct, a grey, or tily-red.

SPECIES XXXIII.—*Heliotrope, Jaspe-sanguin.*

Than jasper less transparent, with little
Lustre, in shapeless masses blood-stone's found.

---

jasper is agate-quartz, provided it has not iron enough to make jasper-quartz, or has much less iron than jasper-quartz.

PORCELLANITE.—Specific gravity 2—33; hard as jasper nearly. Melts at 151 of Wedgwood into a spongy and semi-transparent mass. In this substance fire in the earth has begun to glaze, or slightly vitrify its surface, like pottery over-baked.

HELIOTROPE.—Specific gravity from 2—62 to 2—7. At 114 of Wedgwood grows brown. Helio-

From Egypt, Iceland, and Siberia comes;
Rich in green shades with spots of red, and now
With ochre-yellow; by heat degenerates
To reddish brown, but scarce is fused
With aid of oxygene. — — —

SPECIES XXXIV.

Wood-Stone, bois Petrifié, Holzstein, Lithoxylon.

Lithoxylon in Martinique abounds,
And varies as the wood it represents.

SPECIES XXXV.—*Felspar.*

Felspar with varied tints abounds; flesh red
And grey, but scarcely ever black is found,

---

trope is bloody jasper-quartz, and distinguishable from agate-quartz of a dark-green, dotted with red, by its opacity, since the agate-quartz with a similar face is transparent.

PETRIFIED WOOD is agate-quartz, or wood incrusted. Quartz sometimes incrusts foreign substances, and particularly the dog's tooth calcareous spar, the metastatique of Hauy, and dent de cochon of De Lisle.

FELSPAR.—The essential character is in its natural joints equally distinct, in two directions, perpen-

arely blue, or green. Transparent now
pearly hue, and iridescent rays,
ıow opaque; in fracture foliate,
'stals tetrahedrally disposed,
ıely truncate, and in rhomboids form'd.

---

r the one upon the other. Spec. grav. 2—4378
-7045. Cuts glass, and sparkles when struck
ıt the steel; has a double refraction when cut
acets; very little electricity, and some phos-
ıcence, if rubbed one piece against another in
.rk.

:ording to Kirwan, any compound of silex and
ıe, in which silex prevails, with lime and mag-
enough to make the mixture fusible at 140 of
wood, may constitute felspar. It is a principal
tuent part of granite and porphyry, and found
ıs and nests in secondary mountains. By long
ıre to the atmosphere it decomposes, and turns
hite infusible clay.

: analysis of adularia by Vauquelin, or of lim-
lspar, is

Silex	64
Alumine	20
Lime	2
Potash	14
	100

SPECIES XXXVI.—*Labrador.*

But who can paint the labrador, with all
Its splendid dyes of purple, blue, and green?

SPECIES XXXVII.

Argentine Felspar, Oculus Piscis.

This stone is felspar decompos'd, and
Seems in colour dead, and silvery white.

The porcelaine-clay, or kaolin of the Chinese
felspar argiliforme of Hauy; the petunzè, felspar
minaire blanchatre. The Sievres porcelaine is m
of the same materials.

LABRADOR.—Spec. gr. from 2—67 to 2—69.
green felspar of Siberia of this species has silex
alumine 13, sulfate of lime 12. Labrador fuses
difficulty at 155 of Wedgwood.

FELSPAR in decomposition, is called felspar na
pierre de lune. It occurs crystallized like comm
felspar. Its reflections are white, blue, and gr
very faint. Dodun first found it in the mountain
Languedoc, and on analysis he discovered that it c
tained silex 46, alumine 36, iron 16. Its iridesce
depends on its degree of decomposition. It is so
than common felspar in spec. gr. 2—212 to 2—

SPECIES XXXVIII.—*Felsite.*

Felsite is hard to fuse, and more compact
Than common felspar. It is azure, blue,
Or green, of silver hue, with mica charg'd.
From Styrian mountains first it came,
Immix'd with quartz, and glimmer; crystals none
Of this fine substance have as yet been found.

SPECIES XXXIX.

Andreashergolite, Kreutz Crystal.

Crystals milk white, and half pellucid, form
The staurolite, that cross each other lie;

Felsite.—De Lisle's green felspar is smaragdite of Saussure, and emeraudite of Daubenton, and diallage of Hauy. The specific gravity of felsite is 3. Scratches carbonate of lime, and glass, slightly. It differs from the diallage of Hauy in hardness, as diallage can scarcely be made to scratch glass at all. The green diallage is very compact, and a variety of the laminar; the Verde di Corsica of a tender blue, with large spots of deep green, is of this sort, of which tables are made in Italy, in Corsica, on the Genoese coast, and near the Lake of Geneva.

Kreutz Crystal.—Sp. gr. 2—3333. Scratches glass, phosphorescent by fire, brittle, of a foliated

Or single, flatted, end pyramidal
Four-sided each, both pyramid and prism.

SPECIES XLII.—*Lapis Lazuli.*

No gold in lapis lazuli is found,
Though oft the mimic of that precious ore,
The yellow pyrite specks the azure blue.
Of earthy fracture, and amorphous form,

---

texture. According to Klaproth it contains, silex barytes 18, alumine 16, water 15. The cross-s is found at Andreasberg, in the Hartz, in cry lying across one another, mixed with carbonat lime, from the effervescence of which in the n acid cross stone has been taken for a calcareous by some naturalists. Harmotome is Hauy's n which is, divided by its joints. The twelve-side rieties are found at Oberstein, in the hollow of g of agate-quartz. The difference between the c stone, or staurolite, and the jargon, whose prim form is also an octohedron with triangles, whose are equal, is in the specific gravity of the jargon i proportion of 15 to 8, and hardness. Jargon scra quartz, staurolite hardly glass.

Lapis Lazuli, or lasurdee, is found in sia, as well as Natolia and China. Specific gr 2—7675; scratches glass, and in some strikes fire with the steel. Its colour is azure,

ırface dull, and dense opacity,
stone strikes fire with steel, and polish'd shines;
Persia gets its name, and from iron
ue. — — —

SPECIES XLI.—*Prehnite.*

at the Cape by Prehn, from whence its name,
near Dumbarton found, and last of all

ıre than 100 of the pyrometer into a yellowish mass, and then to a white enamel. At 100 it is its blue colour. Klaproth makes it to contain,

Silex	46
Alumine	14—5
Carbonate of lime	28
Sulfate of lime	6—5
Oxyde of iron	3
Water	2
	100

e blue substance found in the Stirian granite is ɔ bright, or so intense as lapis lazuli. The Arın stone, which is blue oxyde of copper mixed calcareous matter, is neither so hard as the la-, nor does it retain its colour so long in the fire.

EHNITE.—Spec. grav. 2—6097 to 2—6969; ches glass, electric by heat, has a pearly lustre inner surface, swells more than zeolite under

In Dauphiné this stone occurr'd; 'tis known
To swell, and also to enamel fuse
With alkalis, with borax run to glass.

SPECIES XLII.—*Zeolite.*

The zeolite you'll find set like a gem
In toadstone, that is nam'd amygdaloid.
Its colour varies much, from green, and white,
To orange yellow, and to deep flesh red.

---

the blow-pipe; crystallizes in compressed four-sided prisms. It is of a pale apple-green colour. Hassenfratz and Klaproth have analysed it, and found, one, 60 silex, the other 44; the one 20 alumine, the other 30; Hassenfratz 23—3 lime, Klaproth 18.

M. Rochon brought this substance from the Cape before Colonel Prehn. Werner first called it Prehnite, and ranked it with the zeolites, in which Born followed him.

Zeolite.—Spec. grav. 2—0833; scratches carbonate of lime; electric by heat; doubly refrangible. Its fracture is fibrous, and radiated.

Zeolite, or mesotype, found in volcanic countries, the Isle of Ferrol, &c. according to Pelletier contains, silex 50, alumine 20, lime 8, water 22.

Hauy divides zeolites into shining, or stilbite, spec. grav. 2—5. The stilbite is found also out of volcanic countries, at Andreasberg, in twelve-sided crystals lamelliform, on a bed of carbonate of lime.—

als take the cubic form, or shape
hexhedral truncated, or of
laminæ, smooth and shining,
vitreous, not hard to scratch;
mineral to jelly fus'd,
melt emits phosphoric light.

---

abasie, or zeolite in cubes, sp. gr. 2—7176.
orm, a rhomboid rather obtuse. Between
he mesotype the difference is in the angles
the position of the joints one on the other,
o 93¾ in the chabasie. The chabasie dif-
urther in not being electric by heat, and not
g with the nitric acid, as mesotype does.—
alcime, spec. grav. 2 nearly. Analcime is
ite, transparent in some, and of a dead
nite in others, with the aspect of white gar-
like in their crystallization. The differ-
veen these four substances are in their geo-
haracters. See Hauy, p. 185, vol. iii. of
names convey no idea. Most zeolites are
ed on exposure to the air, and are said to
alcedony.

GENUS VII.—*Adamantine Spar.*

The adamantine spar corundum call'd,
Of texture laminate, as topaz hard,

ADAMANTINE SPAR.—In analysing admantine spar, Klaproth thought he discovered an adamantine earth remarkable for the properties of insolubility in acids, and infusibility with either of the fixed alkalis. Adamantine spar is of a grey colour, semi-transparent generally, with a laminated texture, and specific gravity 3—8752, double refraction, and hard enough to scratch quartz. Its crystal is a rhomboid, somewhat acute. The analysis of this substance by Klaproth is,

Silex.....	6—5
Alumine	84
Oxyde of iron ..	7—5
Loss	2
	100

Second Analysis.

Silex	5—50
Alumine.....	89—50
Oxyde of iron..	1—25
Loss	3—75

Dr. Lind first discovered corundum in the granite rocks in China, adhering to felspar, mica, and steatite. Crystals, however, of corundum had been brought

Is form'd of alumine almost entire,
Except some little iron, and silex less,
But no new earth of any kind.

GENUS VIII.—*Jargon-earth, Zircon. Zerk,* Arabic.

This stone is grey, or violet, or blue,
And form'd in tetrahedral pyramids

---

into Europe long before, mixed with spinelle, without being noticed by mineralogists, and set aside without examination. Mr. Hauy discovered a great resemblance between telesie, or ruby, and the corundum, which he had an opportunity of examining in the fine suite of crystals, sent to him from this country by Mr. Greville, of this latter substance. See the papers of the Count de Bournon and Mr. G. on the subject of Corundum, in the Philosophical Transactions.

Count Bournon, who has cultivated mineralogy with greater ardour, and more sagacity, than any one of the French mineralogists, began by considering corundum as a feld-spar, and finished by being convinced of its identity with the telesie. See Hauy.

JARGON-EARTH.—This substance has,

Jargon-earth	70
Silex	31
Oxyde of iron	1
Loss	3

When crystalliz'd; not much by acids touch'd,
And harder still than quartz, but heated red,
And on a sudden quench'd, grows shattery.

GENUS IX.—*Sidneian Earth.*

By Mr. Hatchet's experiments it appears that this earth is not new, but made up of silex, alumine, and oxyde of iron. Philos. Transact. vol. lxxx. part ii. p. 306. vol. lxxxviii. part i. p. 1.

Wavellite. Hydrate of Argill, or Aluminite.

This earth was discovered by Dr. Wavell in the neighbourhood of Barnstaple, and has been analysed by Mr. Davy, who found it to contain 3 parts in 100 alumine, and the rest water, without reckoning what escaped unaccounted for. It has been also found in Cornwall.

It is brought from Ceylon. The Arabic zerk means a blue stone. Specific gravity 4—4; hardness next to the sapphire.

ORDER II.—MIXED.

THE earths or stones we've just describ'd, are all
Invisibly combin'd, and often too
In compounds obvious to the view, and thus
Is marle compos'd of carbonate of lime,
With clay and iron's oxyde, yet that it is
No eye but by analysis can see:

The Verde di Egitto might have been seen in all the shops of the sculptors at Rome, and particularly in the palaces and villas of Borgia and Albano, but in the greatest splendour and abundance in the court of the British Museum. From Hertfordshire and Aberdeenshire we get round and angular fragments of siliceous stones in a siliceous cement, and of white quartz in brownish-red jasper.

Of aggregated stones, of which the mixture is visible, the most remarkable is perhaps the sandstone of Fontainbleau, cemented by a calcareous gluten with quartz. This substance is peculiar to the soil of France. It is found in the quarries of grès, grauwacke, or rubble-stone. The crystals have the structure of the rhomboid of carbonate of lime inverted; they are formed in cavities, where, from some cause or other, the grès is chang'd to sand. The calcareous particles filtred through the cavities penetrate the

Thus quartz or flint in pebbles angular
Or round, or jasper with a chlorite base
Imbedded in siliceous cement lie
Distinct, and visibly immix'd, and form
Pudding-stone, or breccia of Egyptian green.

---

interstices of the grains of quartz, and incrust them whilst they are forming the inverted rhomboid, and although the grains interrupt the continuity of the structure, they do not alter the mechanism of the form. By the analysis of Monsieur Sage, the calcareous part of the crystals was only a third part of the whole mass.

ADDITIONS.

ADULARIA

Is so called from Adula, the name of Mount St. Gothard, where it was found by Father Pini. The superficies of this substance is like that of a pearl, of which the reflections of different coloured lights are not from its interior, but on its surface.

AGATE.

The gem of St. Stephen is a dotted agate, or a grey calcedony transparent, with red spots. Born, Waller.

CHLOROPHANE

Is a substance of a violet colour, and of an emerald-green when placed on a hot coal: if it be suffered to remain, the light grows weaker and weaker, and the stone is discoloured, but if taken off as soon as it has acquired its brightest tint, the stone will not be much altered, and the experiment may be repeated. Chlorophane has a strong analogy with fluate of lime.

CYMOPHANE,

Or wavy light, is the chrysoberil, or chrysolite, 'shot through with changing lights.' The cymophane

is not so hard as the sapphire, but has a double refraction, which the sapphire is without; it is heavier specifically than the emerald. It is not electric by heat as many of the topazes are, but is harder and heavier.

DIPYRE OF HAUY.

This name imports that the substance it represents is doubly susceptible of the action of fire. Between this and the pycnite, or white schorl, schorl artiger beril of Emmerling, the difference is, that the one is infusible, and the other, the dipyre, is easy to fuse; they are both leucolites, or white stones, but the pycnite is the heaviest; the crystallization is alike, but the dipyre is exclusively phosphorescent, and, thrown in powder on a hot coal, shines in the dark. Instead of the two Greek names, which suggest nothing, the substances might have been called leucolite infusible, or leucolite fusible.

MACLE.

A quadrangular prism inclosed in slate. Its essential character is in its divisions parallel to the sides of a prism slightly rhomboidal. It is a black substance, in some instances like swine-stone, inclosed in a white one. It has been called cross-stone, or staurolite. See Hauy, vol. iii. p. 267.

SCAPOLITE

Of Dandrada, is the rapidolite of Abildgaard. The first name means the trunk or stalk-stone, the second the twig or stick-stone.

The exterior character of the scapolite is a needle-like prism, grey or whitish, channelled lengthways, having the appearance of acicular zeolite; but scapolite is not solvable in nitric acid, and hard enough to scratch glass, and acquires no electricity by friction, in all which it differs from the needle-zeolite. It is also much heavier. The prisms of the scapolite are sometimes of dead white, pearly in a slight degree, owing, as M. Hauy says, to the loss of its crystallizing water. Some, according to Mr. Manthey, are incrusted with something like silver mica, which gives them the appearance of crystals of micarelle, and made that able mineralogist suppose that scapolite and micarelle were allied.

SIENITE

Is a species of granite, made up of quartz, felspar, and hornblende, with or without mica, aggregated in different proportions, supposed to be posterior to granite. It gets its name frome Syene in Egypt, or Assuan, where Eratosthenes attempted to measure the circumference of the earth. The cathedral at Kolm-kill is said to have been built with sienite.

SPHENE,

Or in the shape of a wedge, has been called the new violet schorl, though it occurs of different colours. It is found in the Alps and in Dauphiné, with crystals of quartz and felspar. The difference between the green schorl of Dauphiné, or thallite, and sphene, is its divisibility by oblique sections, whilst the thallite is divided by a section parallel to the axis of its crystal. The sphene is still more glassy than the actinolite.

TREMOLITE.

On Mount Gothard the silky grammatite
Occurs, (which Pini found in Tremola,
Whose fibres parallel in masses run,)
In colour white, of slight transparency,

Tremolite, or grammatite of Hauy, consists of, silex 65, magnesia 10—33, lime 18, oxyde of iron 0—16, water and carbonic acid 6—50. Fibrous grammatite, or tremolite, differs from asbestos in being phosphorescent on friction, or fire, and by the dryness and roughness of its powder, when triturated, which in asbestos is soft to the touch. The specific gravity of tremolite is 2—9257 to 3—2. It is hard enough to scratch glass, and is scratched with difficulty by quartz. If it be struck, or rubbed in the dark, it sheds a reddish light, and if thrown in powder on a burning coal, emits a greenish tint. The primitive form of this substance is an oblique prism with rhombic bases. Fibrous tremolite has been brought also from the mine of Kadainsk, near the river Amour, in Siberia, in a matrix of dolomie. The fibrous tremolite differs too from actynolite, according to Hauy. The one, he says, se divise sous les angles 124d. et 55d.; the other, the grammatite, at the angles of 127d. and 53d. The one also, it may be added, melts to a yellow-green co-

And pearly lustre; in nitric acid
Soluble, and effervescing, when rubb'd
Grows phosphorescent, and with heat intense
Melts to transparent glass. — — —

---

loured glass, whilst the tremolite runs to a white. The prisms of the tremolite, if broke across, often shew a line which passes by the two acute angles of the rhomb, and exhibits a representation, as it were naturally, of the great diagonal of the base of the prism. It is from this accident that the substance has got its name of grammatite; just as pteris in botany takes aquilina for its trivial, on account of the spread eagle, which is produced by a section of the stipes, or trunk of the fern oblique to its base.

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FINIS.

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With a Commentary from the Persian, and Notes by the Translator, &c. &c.

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Wernería,

(Part the Second)

OR,

SHORT CHARACTERS

OF

EARTHS

AND

MINERALS:

According to

ıPROTH, KIRWAN, VAUQUELIN, AND HAUY.

WITH

LES OF THEIR GENERA, SPECIES, PRIMITIVE CRYSTALS, SPECIFIC GRAVITY, AND COMPONENT PARTS.

By TERRÆ FILIUS PHILAGRICOLA.

London:

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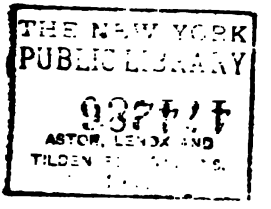
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Not ductile.

Genus			Species
7	Bismuth	3	
8	Cobalt	4	
9	Arsenic	3	
10	Manganese	1	
11	Antimony	4	
12	Uranium	2	
13	Molybdena	1	
14	Titanium	2	
15	Scheele	2	
16	Tellurium	1	
17	Chrome.		

ERRATA.

PAGE	LINE
9,	6, *for* grains are, *read* grain is
32,	7, *for* is, *read* 'tis
57,	3, *dele* in
57,	15, *read* 23.5
59,	9, *read* Können
60,	2, *read* laminæ
70,	Article *Gablronite insert page* 51
74,	3, *from the bottom, for* lint *read* flint.

INTRODUCTION.

METALS, when pure, are seen in high relief
'Bove other substance mineral, in weight,
Opacity, and brilliancy complete.
But qualities like these, however pure,
By heterogeneous principles are veiled,
And bodies that possess'd them e'en so chang'd
By combination to belie themselves.
Thus lead will look like carbonate of lime,
When to a white transparent body chang'd
By carbo's acid, and by oxygene.
Thus zinc to sulphur gives the topaz hue;
Thus antimonial and sulphuric aid
To silver will impart the ruby red.
To find these metals in their deep disguise,
And break the chains that hold their borrow'd forms,
And make them in their native lustre shine,
Is all the chymic art of man can do.
Bodies that with metallic brilliance shine,
When in due order of their splendour ranged,
Begin with platina, and end with lead.
Between th' extremes come iron, silver, gold,

Copper and Tin. A metal pure remains
Unchang'd in colour, but add to iron
Sulphur, and soon to yellow it will pass.
To silver, and it shows like livid lead.
File any metal, simple or compos'd,
To powder fine, the bright a black becomes,
And tho' in Elba's iron-dust a shade
Of red appear, from oxidized parts
Of iron-metal 'tis that red proceeds.
[1] Tin that's the lightest of the metal tribe,
Weighs twice as much as sulphate of Baryte.
'Tis from this dense [2] opacity, metals
Reflect in streams the brilliant light, to which

---

[1] Tin, the lightest metal, is to sulphate of Barytes the heaviest earth, as 7.5 to 4.5 in specific gravity.

[2] The order of density in metals, with addition of mercury to the former, is

Platina
Gold
Mercury
Lead
Silver
Copper
Iron
Tin.

l their metallic splendour owes its birth.[3]
ıe metals yield to many a precious stone
hardness,[4] and are with advantage used
dust, to make their surfaces more bright.
ı metals are elastic, in like order
ı are they hard, and where these qualities
›gether join, bodies sonorous grow,
ıd sounds once raised long vibrate on the ear.
ıe [5] ductile metals yield to pressure, and

---

[3] Many chymists have suspected barytes of being metallic substance. Lavoisier, t. 1. p. 174.

[4] Order of hardness.
Iron or steel
Platina
Copper
Silver
Gold
Tin
Lead.

[5] Order of ductility.
Gold
Platina
Silver
Copper
Iron

Draw out, but separate not, adhering,
Tho' molecules from others wider stand.
This power the metal substance only knows,
Glass is not ductile but by heat, nor clay,
Unless some liquid it imbibe, but gold,
One single grain of gold [6] well beat, tho' cold,
Will clothe full many an ell of silver wire.
By simple fusion metals are not changed,
But new arrangements of their parts take place,
Yet some by fire intense are turn'd to glass,
And of all others antimony first.
The force of water can no farther go

Tin

Lead. Nickel and zinc come nearest to the above in this particular. Antimony, bismuth, and cobalt break under the hammer. Gold, the most tenacious of metals, dilates like others by increase of heat, and in like proportion.

[6] Order of tenacity.

1 Gold
2 Iron
3 Copper
4 Platina
5 Silver
6 Tin
7 Lead.

Than copper, iron, and sulphate-zinc to fuse.[7]
Metallic substances possess the power
The fire electric to conduct, with, or
Without metallic brilliance, as certain
Bits of silver red, and the brown oxyd
Of crystal—Tin.[8]
Fire acts on metals, that by force of heat
The sulphur, and the garlick smell exhale,

---

[7] Order of fusibility.

Mercure
Tin
Lead
Silver
Gold
Copper
Iron
Platina.

[8] This is occasioned, according to Haüy, by the presence of certain molecules which have lost their oxygene. With respect to metallic bodies which have a glassy look, as the sulphuret of zinc, the carbonate of lead, they are commonly like earths, in being idio-electriques, and become positively so by friction. Among these bodies there is one, oxidized zinc, which becomes electric by simple heat.

And whisper whence they stole their[9] mineral powers.
Of metals, in their primal form, we have
No perfect knowledge, in the ductile tribe,
As gold, and silver, copper, we can find
No natural joint, and those with oxygene,
Or other principles combin'd, in mass
Irregular, or in a state of dust
Have hitherto been found.—[10]
Amidst the primal forms divisible,
The cube and octohedron reign, as in
The bismuth, and the antimonial ore,
The sulphuret of iron, and cobalt grey.[11]

---

[9] The odour of sulphur and garlick arises from the liberation of the sulphur and the arsenic, which are principally concerned in the mineralizing the substance that gives it out.

[10] The minuteness of the crystals of the muriate of mercury, and the arseniate of cobalt, will not admit of mechanical division.

[11] The regular four-sided figure is the primitive form of grey copper, and of the substances that have lost their metallic splendour by uniting with other substances; the sulphuret of mercury is divided into a six-sided prism, the sulphuret of zinc into a twelve-sided rhomboidal figure, and the phosphate of lead

Three substances the rhomboid shew,[12]
No metals in the bowels of the earth

---

into a dodecahedron with a double pyramid, so that the class in question has this peculiarity, that it shews the six primitive known forms united together.

[12] Antimoniated silver ore, or red silver, sulphate of iron, or vitriolated iron, and specular, or oligiste. In other kinds, as the oxyd of zinc, or calamine, sometimes the rectangular octohedre. Sometimes the prisme droit obtains, which is rhomboidal in the arsenical iron, or mispickle, and rectangular in the oxyd of titanium, and in the ferruginous tungsten or wolfram. The sulfate of copper is the most irregular of all the known nucleuses, with its oblique-angled parallelopiped, of which the solid angles are formed by the junction of three planes of different inclinations, at angles neither 90, nor 60, as in the feldspar. The conclusion is, that metals vary prodigiously in their primitive forms within the widest boundaries. The property of metallic substances is to have the metallic splendour, or a susceptibility of acquiring it, but in order to know those that have not this character, should they weigh specifically more than 4.5, should their colour remain after

Are pure, and in a native state,—or quite
Of ev'ry heterogeneous mixture void;
But art and fires can combinations break,
And set the imprison'd substance free
From all its shackles.[13]

---

trituration, or only change to a neighbouring shade, a little more or less vivid; or lastly should they emit, on being roasted, a smell of sulphur, or garlick, you may safely conclude that they are, if not totally and entirely, at least in great part metallic.

[13] Gold, silver, lead, &c. &c. are purified by fusion, and their reguluses admit of crystallisation in cooling, as Rouelle first showed in the instance of sulphur; the crystals are formed in the midst of the metal whilst in fusion, by the junction of the parts as they cool; just like water that crystallises in freezing, whilst surrounded by a fluid, or like matter that ossifies in the midst of soft substances. If you cut up a piece of clay that has been taken out of a solution of alum, and suffered to dry, you will find in it crystals of alum of the size of a pea; since the crystallising particles having overcome the clay molecules, unite by removing all the obstacles to their union.

PLATINA,

Of all the metals is least fusible,
Less hard than iron, less ductile too than gold,
And in tenacity to both unlike.

PLATINA was discovered by Don Ulloa, in 1733, at Peru, and first brought to Europe by Charles Wood, in 1741, from Jamacia. It has been found also at Barbadoes. It occurs in grains, and sometimes in large pieces of two or three pounds, and in a figure the size of a pigeon's egg. The grains are of a small flatted angular shape, and of a dark tin white colour, containing one third of its weight in iron, whence it acquires its magnetism, and purified loses one half of its gravity. It is accompanied also by gold and mercury, from which it is easily separated. Various articles of different kinds have been manufactured of Platina, allayed with arsenic, such as crucibles, and spoons for chymical purposes, and vases and boxes susceptible of the highest polish, for use and ornament, and also with the greatest success mirrors for reflecting telescopes, that are not liable to tarnish, nor subject to the inconvenience of producing two images, but by their superior density increase the powers of reflection.

In native colour livid white, refined,
As silver splendent; in aqua regia
Soluble, and the burning mirror's fire;
Or by the flaming stream of vital air.
From silver ore in hardness differs much,
Nor by the nitrous acid, that silver melts,
Is touch'd, but welding by the force of heat
Joins end to end, an art unknown to gold.

GOLD.

Pure gold is splendid, of a yellow hue,
And yields in weight to Platina alone,

Gold, in a state of purity, is about 19.2572, being to water as 19.300 to 1.000, whilst platina, in the same state, is 20.980. It melts at 5.237, Farenheit, to a beautiful blueish green; with the oxy-muriatic acid it forms a yellow solution, that imparts a purple tinge to the skin. Mixed in fusion with silver it grows paler, like the electrum of the ancients; with copper it becomes of a deeper colour. The oxyd of gold stains glass red. Gold is always alloyed with silver, copper, or iron, even in its purest state, in the proportion nearly of our common coin. Native gold is sometimes tarnished of a red brown,

dness too by platina surpassed,
er, iron, copper; not tin, or lead:

---

le brassy colour, or of a bright yellow. It
also either in eight-sided crystals, or in de-
shapeless masses, or running in branches over
ubstances, or through them, or appearing in
beneath the surface as under a glass, or
le grains. At Nagyac in Transilvania, it
:n found interspersed with bright yellow

:hemniz in brownish red sinople, or opaque
called by Dolomieu hematide quartz.
ber in Hesse, in dull yellowish clay.
ıreuth in grey antimonial ore.
:onsbock in Bohemia, in reddish brown
›rescent blende with transparent laminated

luctility of gold distinguishes it from copper
of nearly the same aspect, which latter
›ff short under the hammer. The copper
is soluble in the sulphuric and nitric acids,
ı the former will not touch gold, and the
ll scarce produce any sensible effect upon

precipitate of gold, from its solution by tin,
purple used to colour porcelain. One of

Than all more ductile, more tenacious,
But least sonorous of the metal tribe.
Tho' readier to fuse than platina,
Than copper or than iron, yet less than tin,
Than mercury or lead.

SILVER.

Silver less dense than platina, or gold,
Than lead or mercury, but heavier

---

the essential characters of gold is yellow, whence its name in the time of the Romans of moneta flava.

'An de moneta Cæsaris decem flavos' id est nummos aureos Domitiani. Mart. Epigr. 66. lib. 12. There is hardly any sand in which there is not gold, but so sparingly dispersed as not to be most fortunately not worth collecting, or else, like the Irish peasants in Wicklow, we should leave the plough to go a gold gathering, and starve.

SILVER is furnished also from the mines of Peru and Mexico. It is found too at Konsberg in Norway, at Furstemberg, and Johngeorgenstadt, and Freyberg in Germany, at which last place the amalgamation is performed in infinitely less time, and with less loss of mer-

Than copper, tin, or iron, in character
Essential is both white and malleable.

---

cury than in America, where it takes a month, with a loss in each operation of 25lbs of mercury in the hundred weight, and yet a part of the silver is left in the ore. At Freyberg the operation is finished in 24 hours, with the loss only of half an ounce of mercury, and a small quantity of silver is obtained, not indicated in the cupellation of the assayer. The greatest mass of this metal, is said by Albinus in his Chronicle of the Mines of Misnia, to have been found at Schneeberg in 1478; it weighed by computation about four hundred quintals.—Albert de Saxe, who went down into the mine to see this monster, dined upon the enormous block, and observed to the company, that the emperor Frederic is a powerful monarch, but he does not keep so rich a table as I do. Agricola, who wrote after the death of Albert upon the spot, says, that he never found any one who knew the exact weight of this rock of silver. This metal, when fused and suffered to cool slowly, produces arborisations like gold, composed of octohedrons heaped on one another, and piled pyramidally. Silver gets completely tarnished when exposed to sulphureous and inflammable vapours. The French crowns hid in the latrines during the re-

'Bove gold in hardness, yet to iron yields,
More ductile and tenacious than the rest,
Save gold alone, tho' brighter than them all
But platina and steel.

---

volution came out quite black. The sound of silver is clearer and more open than that of other metals, and more pleasing to the ear, and noticed as more agreeable by the poets.

'And the press'd watch return'd a silver sound.'

POPE.

Silver, alloyed by a considerable portion of brass or copper, does not lose its whiteness, whilst a small quantity of copper mixed with gold changes that metal, and gives it a higher tone of colour. The reason has been supposed to be that the white metals have more surface in the particles that compose them than the yellow, and at the same time are very opaque, so that they do not suffer the metals they cover to pierce through them. Silver, dissolved in the nitric acid, gives triangular and hexagonal plates, which melted in a crucible and cooled, turn to a grey mass, that is used as a caustic, and called lunar.—See the table.

MERCURY.

n—white in colour, of a silver hue,
nless by freezing fix'd, like water flows;

MERCURY is found in shining globules in the terior of different substances, such as schist, marl, iartz, accompanying cinnabar, pyrites, and sulphut of lead, and red silver, occurring in the fissures id cavities of rocks in Idria, Carniola, and at lmaden in Spain, and in America, near Guanca elica, a small town of Peru. Mercure amalgaates with almost all metals, by which property, id its volatility it is rendered so useful to the arts gilding and mining, &c. &c.

Horn quicksilver is crystallised in the hollows of arse ferruginous cinnabar ores, and is generally companied by native mercury; its crystals are hite, grey, green or blackish in colour, somewhat ansparent, in form four-sided rhomboidal prisms, ith tetrahedral pyramids.

Cinnabar is the commonest ore of quicksilver, rystallised, or amorphous, or efflorescent on the urface of other substances. It is fibrous, granular, caly or compact, so soft at times as to stain the ingers, brittle, and rubbed to powder grows light

Unalter'd it remains to simple heat
Or air expos'd, but by agitation
It will a black, and then an oxyd red
Become with aid of fire, from whence you may
By force of caloric the ruby calx
To its metallic state again recall.
With different acids when to an oxyd
Brought, it readily combines, if set free
From these, whate'er 's thrown down with sulphu
mix'd,
Will by the aid of gradual heat explode.
This metal once by chymists long ador'd,
Besides its antisiphylitic use,
Works the gold ores, makes mirrors, gilds, a
paints.

---

and dull, losing its brightness. It has the form
double tetrahedral pyramids, truncated at th
summits; with or without intermediate prism
The purest cinnabar holds 80 parts of quicksilv
and 20 of sulphur.

Hepatic ore, or alkaline cinnabar scratched em
a smell of rotten eggs.

LEAD.

ure lead is soft, and to the nail gives way;
nd soils the fingers with its touch; livid

THE existence of native lead is now generally admitted, though with great caution on account of the number of founderies of this metal anciently established, which after they had been long destroyed, might have left many remains of their cast materials in the earth. Mr. Rathké, a learned Dane, found a large quantity of native lead in the island of Madeira in small turbinated masses sunk in soft lava, which proved to possess all the characters of lead, and must be considered as native at least, as produced in the matter of a volcano; but other specimens have been discovered in Brittany and Monmouthshire. Lead crystallises like gold and silver in small octohedrons, one on another, forming a quadrangular pyramid. The specific gravity of this metal which is proverbially so heavy, is almost bulk for bulk as light again as gold; being only as 11 to 19, or thereabouts. The want of hardness, splendour, ductility, and elasticity makes lead unfit for matters of nicety, and of delicate workmanship. The oxyd of lead is used in enamelling, and the composition of glass. Minium or the red oxyd is

In colour grey, but to the air expos'd
Changes to yellow white, and bluish black.
In taste and smell, if rubb'd, unpleasant, more
Malleable than ductile, less hard, less bright
And less tenacious than all the rest.
In every acid soluble, with gold,
With silver, and with tin in fusion joins,
And e'en with sulphur, and with phosphorus
Combines: In manufactures great it's use,
For shot, for pewter, and for soder soft!

---

achromatic telescopes; the yellow oxyd or massicot in painting, and the white or ceruse produces the fine white colour, that is famous for annoying the bowels of those that grind it, by the colica pictorum et pictonum. Litharge which is an oxyd of lead in small green scales, is used to decompose the muriate of soda, that when fused gives the fine yellow which enters into the composition of varnish. Lead in a state of litharge absorbs the acid of wines, which have been ill fermented, and makes them sweet; in order to detect the presence of lead in wine, and its quantity, Mr. Fourcroy poured a solution of the sulphuret of hydrogene gas in distilled water into some wine that had been litharged, and obtained a black precipitate, of which the abundance was in proportion to the quantity of oxyd of lead in the wine.

COPPER.

A dull and muddy red with yellow tinged
Pure copper shows, in fracture granular;

Copper excels in tenacity, since a wire of one tenth of an inch in diameter will support a weight of 299½ pounds, and is also the most sonorous of all metals, as appears by the kettle-drum of the Persians, made principally of this mettle under the name of *Ruyeen Khom*, or vulgarly called by us *Gong*. Native copper abounds in Siberia, and in Cornwall; the largest mass of it ever found was in a valley near Cachoeira in the Brazils, weighing more than 2600 Portuguese pounds. Copper stands between gold, silver, and iron, more common than the one, and more manageable than the other, and would if removed form a great void in the region of the useful and ornamental arts. Air and moisture however cover it with a green rust, vert de gris, which has often proved destructive to the incautious. Similor, tombac and Manheim gold is an allay of copper and zinc obtained by cementing the copper with lapis calaminaris. The bronze of the ancients was made by allaying with copper a certain portion of tin. Æs, in Latin, means copper, and copper mixed with tin. Virgil dips the hissing brass into the lake to cool it, no doubt as that metal is not

Than gold less ductile, and than iron less hard,
Makes tin more brittle, gold more tough; itself
By arsenic's whiten'd, and by zinc 's turn'd pale;
With sulphur mixt its fusive powers increase.
Its oxyd gives to glass an emerald green.
Its crystals cubes and octohedrons bear,
Of form minute in quartz, and fluor set.
In masses native copper's found that thousands weigh.

---

hardened like iron by being immersed when hot in cold water.[a]—The rust which covers coins and statues with a plaster of oxyd of copper, known by the name of patina, helps to preserve them, by growing harder and more indestructible than the coin, or statue itself. Grey copper analysed by Klaproth, at Andreasberg in the Hartz, commonly called Fahlerz, contained,

Parts	Lead	34.00
	Copper	16.00
	Antimony	16.00
	Silver	2.5
	Iron	13.00
	Sulphur	10.00
	Silex	2.5
	Escaped	6.25

[a]— — — — — 'Stridentia tinguntÆra lacu?'

Georg. 4, v. 173.

NICKEL.

Like iron nickel's by the magnet drawn,
And as iron too almost as hard to fuse,

THE uses of Nickel are as yet a secret to all. This metal has been confounded with iron, and supposed to be a modification of copper, but Kupfer Nickel may be said, like other terms, to be so called because there is no copper in it, or nothing of which the term bears the name. The crystals of sulphate of iron, sulphate of copper, and sulphate of Nickel differ in their forms both primary, and secondary. Iron becomes ductile from being fragile by uniting with Nickel, which when separated from substances foreign to it, has been found to be evidently ductile. Klaproth analysed crysoprase and found it to be coloured by Nickel, which in that state was attracted by the magnet; this only shews that other substances than iron have the magnetic fluid in their pores. Nickel unites in fusion with arsenic, sulphur and cobalt, and detonates like most other substances with nitre, and affords a blue precipitate on adding ammoniac to its solution in nitric acid. Haüy speaks of prase, or crysoprase, as if they were the same, but this is not so, and the analysis of crysoprase

Igniting in the open flame becomes
An oxyd brown, or green, that to soda gives
A hyacinthine tint, to potash blue,
And microcosmic salt a yellow bright.
Nickel in nitric acid cools in rhombs;
One hue alone in every fusion reigns
That dyes the chrysoprase a beauteous green.

IRON.

In hardness iron to no metal yields,
In lightness is surpass'd by tin alone.

---

given from Klaproth, at p. 71 of the earths, does not belong to prase which has not been analysed.

Iron, which occurs every where in such abundance appears so different in the mine in its earthy state of dirt and rust, to what we are used to see it when cleared of its impurities, that it gives us no mean idea of the industry and ingenious contrivances of our early ancestors in surmounting the immense difficulties they must have had to encounter in clearing a subterraneous country, and extricating from its bowels such refractory materials without machines, and with instruments of a nature still softer, and more pliant than the reluctant adversary

n colour bluish grey, not fusible
y fire, but by all acids may be solv'd;
nd in white heats becomes so soft
s to permit its different parts to join,
nd in one common mass incorporate;
ave iron, no metal by collision burns;
nited and to gas of oxygene
xpos'd, most fierce and bright it glows, and flames,
nd to an oxyd grey transmutes.——

---

ey had to contend with. This metal of iron seems
be dispersed over the surface, and through the
terior of every part of nature; earths are full of it,
nd it serves to give colour to the hard stone, and
e precious gem, and the variegated marble, in their
veral dyes and veins, which are produced by the
nion of iron with oxygene in a variety of propor-
ions. The tenacity of iron exceeds that of copper
s 450 to 299½. In solution with the sulphuric acid
t forms a crystallisable salt of a sea-green colour;
reen vitriol with the Prussian acid, Prussian blue
vith the acid of galls the basis of ink.

TIN.

Tin's of much lustre, silvery white, both soft,
And malleable, crackling, not sonorous,

Tin in a wire of $\frac{1}{10}$ of an inch diameter will only support a weight of $49\frac{1}{2}$ pounds; its specific gravity is about seven times that of water; by the action of air and heat united it may be changed to a greyish oxyd, which added to glass will enamel it, by giving an opal-tint, and making it opaque. Solved in the oxy-muriatic acid, the infusion of cochineal will be of a bright scarlet. Antique bronzes contain about 22 parts of tin in 100 of copper and tin. The oxyd of tin after a long calcination produces a hard refractory white powder, called putty, which mixed with vitrifiable matter, makes an enamel for porcelain, and serves to polish hard metals and stones. The Potin of which the Egyptian imperial series of coins was made, is composed of the dross of yellow copper, of lead, tin and calamine. Tin lies in quartz, in granite, and a whitish or yellowish lithomarge, and is found with arsenical iron, and now and then with tungstenite, either ferruginous, or calcareous, in Cornwall, at Altenberg in Saxony, or Schlackenwald in Bohemia. The tin of Saxony is mixed with

Of small tenacity, and very light.
With nitre detonates, and gives to glass
Opacity and colour, makes e'en gold
Less malleable, and fragile by its fumes;
To iron adds splendour, hardness, resonance.
Its use in art the printer's types confess,
The mirror, and the culinary vase
Against the copper's baneful poison sheath'd.

---

opaque topazes of a dead white colour, some of which are an inch and a half thick. Tin in crystals may be distinguished from those of other substances very like it, by a recess which may be observed where the crystal is joined, or at the union of the two halves. Tin loses $\frac{1}{20}$ of its weight by oxydation, whilst other metals lose a third, and sometimes an half. Sulphuret of tin contains of

Sulphur	25pts.
Tin	34
Copper	36
Iron	2
Loss	3
	100

The copper however which abounds in this analysis is only accessory, and not principal.

ZINC.

Between the ductile and the fragile ores
We place the semi-metal zinc, because
To thin plates it may be beat, and break not.
Zinc is in colour white with shades of blue;
In nitric acid effervescing solves.
In burning sheds a brilliant flame, scatt'ring
Like snow its fleecy flow'rs, its texture's broad

Monsieur Sage succeeded first in laminating zinc. The action of heat which increases the ductility of other metals makes zinc brittle, and capable of being reduced to powder in a mortar. Zinc in commercial use has commonly a little lead in it. What comes from the Indies under the name of Toutenague is much purer. The true Toutenague from China, a white metallic substance, is presumed to be an artificial mixture of different metals. The word *tutenag* is Persian, and means a mould for casting metal, *tetenk*. In Father Angelo's Persian Vocabulary it is *tebenk* which is no doubt an erratum. The great use of zinc is to make brass; it has been proposed to use it also instead of tin for lining vessels, and oxyd of zinc obtained by com-

And striated, by pressure heavier grows.
The fire on zinc works wonders that unknown
To other metals are; tho' malleable
When cold, by heat 'tis brittle, and to dust
Returns; of zinc, brass, pinchbeck, tinsel's made.

BISMUTH.

The brittle bismuth into grains beneath
The hammer beats, in colour yellow-white,

---

bustion has been substituted in the place of white lead for painting. The white light of rockets and fire-works is produced by the meeting of zinc and nitre.

NATIVE BISMUTH is of a yellowish white colour, whilst sulphuret of bismuth inclines to a leaden grey with superficial variegations of red and yellow; the former is not found crystallised in needles like the latter, which does not effervesce in the nitric acid, as the native does. The sulphuret has no smell of garlick when acted upon by the fire, as the native sometimes has owing to its containing a little arsenic. The regulus of bismuth in cooling takes very distinct crystalline forms of right angled parallelopepids,

Of all the ores but tin most fusible,
Excepting arsenic, cobalt, zinc; combines
With all metallic bodies, and dissolves

---

and wedge-shape octohedrons. The common forms are in plates one above another like an inverted pyramid, or an Etruscan border, or the representations of the waters of the Mæander on the coin of Acmonia in Phrygia. A fine white is procured by a solution of bismuth in the nitric acid, precipitated by the addition of water, called the painter's white, or magistery of bismuth.

A sympathetic ink is made of this metal dissolved in the nitric acid, which if wetted with a sulphureous liquid will appear of a deep black. Write on the first leaf of a book, and wet the last with a solution of hepar sulphuris, shut the paper-book, and on opening it the letters will come out a jet black. The hepatic gas was in this case supposed to have penetrated through the leaves in order to unite with the solution of bismuth, but on sticking the leaves of the book together at the edges, you intercept the communication and spoil the experiment, which seems to say, where it succeeds, that thin plates of air between the leaves conduct the hepatic gas from leaf to leaf, till it reach the writing.

mmon flame of candle, or of wax,
ı the nitric acid boils, and spreads
ɔud of yellow green.

COBALT.

lt less than bismuth weighs, ready is
'eak, and pulverise, fine grained, and close,

---

red and grey jasper are sometimes found den-
al appearances of bismuth beautifully disposed
e surface of the stone, which on being struck
the steel emits sparks, and a strong smell of
k arising from the grains of native bismuth in
ısper, or as others will have it, mispickle, that
senical iron.

:E German miners gave the name of cobalt to
upposed semi-metal from the mischief it did, and
/ils it occasioned by the vapours of arsenic with
ı it was accompanied. Cobalt means in German
ked spirit, the familiar inhabitant of mines and
ɜs that delights in tormenting. Cobalt though
ıct from iron resembles it in its magnetic virtues,
ıe magnetic needles made by Wenzel of this
l in a state of purity, sufficiently testify.

Tin-white in colour, and can either pole
By magnetism attract, and grow itself
At either end magnetic, hard to fuse,
But still with effervescence soluble
In nitric acid, and then its oxyd
By borax melted dyes the melter blue.

Romè de Lisle once obtained small cubes of metal in groups in the cavities of a mass of c artificially melted; in general the surface of substance after fusion is only superficially stri and reticulated, or knitted. Cobalt in its sta oxyd with pounded flint, or sand, makes a fine called smalt, azure blue, or Saxon, Bohemia Wirtemberg, in all which places it is prepared; this colour glass and crystal are made to pa sapphires, lapis lazule, &c. Porcelain and Fr paintings also employ it. Cobalt when tarn inclines to red, its fracture is compact, uneven, of a fine grain, and nearly sufficient in hardne strike fire with, but brittle. A solution of it i nitric acid is of a reddish colour, and if diluted be used as a sympathetic ink, changing to a and with iron to a green, when heated, and bec invisible when cold.

ARSENIC.

Steel-grey is arsenic, that but touch'd with fire
Soon tarnishes, and sheds an odour strong

Arsenic is derived from a Persian word *Zarneekh* transposed into arsenic, as gogoltha in Syriac into golgotha, spicatæ into πιστικῆς by Marc and John, with a Greek termination for the Latin word; opsonia into asponia by the Jews; and lastly Sykes a proper name into skyes by the Hindoos, all for the ease of pronunciation. Arsenic holds a place among the metals on account of its properties; in a pure state it has all the characters of a metal, but when combined with oxygene it approaches to the saline corps. In close vessels it sublimes unaltered at a certain heat, but if exposed to air it burns with a smell of garlick, and a blue flame, and is changed to a white oxyd which may be volatilised. Arsenic is seldom found by itself, but serves to mineralise different metals, such as iron and cobalt. In common language arsenic means the white oxyd of this metal freed from cobalt, and other arsenical minerals. The antidotes to this active poison are sweet oil and different mucilages.

Of garlick grateful to the Spanish nose;
Is easy both to scratch, and break, and soon
From other metals, iron, wolfram, tungsten,
Known, or by loss of brightness, or by smell.

MANGANESE.

Of manganese in its metallic state
No use has yet been made, is bright, but soft,

Sulphur of potash diluted in water will neutralise the arsenic by uniting it with the sulphur. Thus a plant placed under a glass with quicksilver will infallibly die, but put both sulphur and quicksilver, and the sulphur will neutralise the quicksilver and make it harmless. Fly powder is made of native arsenic pulverised. The dyers use the oxyd, and the glass-makers also for their glass called crystal, but it is apt to soften the article, and make it liable to change from the mere effect of the air upon it, if too much of the oxyd be used.

MANGANESE is very hard to fuse, perhaps as much so as iron. Exposed to the fire, with a stream of air in contact with it, it is reduced to an oxyd, at first whitish, afterwards gradually black. Its

And friable, where not in union join'd
To other substance. The manganese dyes

---

oxyd gives a tinge of violet to glass of borax. Chymists have entertained a variety of opinions about this substance. Some have considered it as an iron ore with very little iron in it. Others rank manganese among the earths as well as wolfram its attendant, and rate them as calcareous substances with an unknown colouring principle. According to de Lisle, manganese owes its origin to an intimate union of the oxyd of zinc with a small portion of iron and cobalt, and that this mixture, in a state of crystallisation, was mineralised by the ci-devant mephitic acid, that is the carbonic of this day. Gahn was the first who succeeded in obtaining manganese in a metallic state properly so called; after Bergmann had advanced that black manganese, as it occurs in the bowels of the earth, had within it the oxyd of a new metallic substance. The changes this metal undergoes in passing from white to a rose-red in its fragments exposed to the air, and from thence to a violet, a brown, and at length to a black, put us in mind, says Haüy, of a name given by Scheele to a combination of oxyd of manganese, and potash, the colour of which was green in hot

Glass of borax purple, the finger stains,
And tints the tablet white with black, yet is
Not but in powder by the magnet drawn.
When fus'd with quicksilver unites not, nor
Can with sulphur be combin'd.

ANTIMONY.

The antimonial ore at certain heats
Of Farenheit will melt, and cool in stars.

---

water, and red in cold, the chameleon mineral. The thumerstein and fluate of lime are coloured by manganese, which is called the soap of glass, because it clears glass from its impurities, but in too great a quantity makes it red or purple.

It is a character of antimony that it is soluble in nitric acid, leaving a whitish deposit in the liquor. The colour of this metal is the white of tin, the texture of it lamellar to a considerable degree, and the substance very brittle. It divides both into a regular octohedron, and a twelve-sided rhomboidal figure in a direction parallel to their facets. Native antimony was first discovered at Salberg in Sweden by Swab, and has been since found in Dauphiny by Mr. Schreiber inspector of the mines near d'Allemont,

In vessels close sublime unchang'd, but when
To open fire expos'd, evaporate

---

and at the first blush mistaken for arsenical pyrite by Mr. Sage, who was afterwards convinced of its real nature. The matrix of the Dauphiny sort in plates is quartz; of the Swedish, white carbonate of lime, that is to say, in particular specimens. The combination observed in the purest pieces of antimony on breaking off different parts are endless, and produce varieties of solids more or less irregular, of which the mechanical division is often concealed in the interior of the mass. Antimony is used in the casting of letters, and printers' types, and in the making of metallic mirrors, and hardened by mixing tin with it in the proportion of 18 to 100. Great hopes have been entertained of finding the philosopher's stone by the help of this metal, which has led to the discovery of its real and most valuable qualities in medicine, and the arts; though no way has been found through it that conducts directly to the golden mine; but in repeated excavations of a soil treasures have been dug up, though not those that were the immediate object of research. Antimony destroys the magnetic property of iron, and prevails probably at those times when the needle

In smoke, and forms acicular assume;
By calcination to a greyish calx will turn,
That vitrifies in hyacinthine glass;
In nitric acid will an oxyd leave
Of white insoluble.

URANITE.

Pure uranite in colour is dark grey,

---

loses its polarity, like nickel and soft iron, which compose the stones in great measure that fall from the clouds in storms. The crude antimony of the shops is a grey striated compound produced by the union of antimony with sulphur.

THIS metal was discovered by Mr. Klaproth in 1789, in a substance which was considered as a variety of blende; he found it again in a mineral in small green plates which is the second species of Monsieur Haüy, called by many mineralogists a muriate of copper. There is nothing that is so creditable to chymistry as the ability it possesses of distinguishing minerals found together to be one and the same species, whose exterior characters are apparently at an infinite distance from each other, but

little lustre, and as soft as tin,
e, in nitric acid soluble.

ıdvantage is greatly enhanced when it enriches a new genus the science which it illustrates. ›xyd of uranite is of a yellow colour, is soluble ost acids, communicating to microcosmic salt, the concrete phosphonic acid a grass-green ır. Klaproth makes the green colour of the allised, and the reddish of some varieties depend the presence of a small quantity of oxyd of cop- ı the green sort, and in the other of oxyd of iron. rest he says, is uranite united to the carbonic or is now considered with greater probability state of oxyd. This metal is found for the most in brown and red iron stone and indurated clay, pech-blende, and sometimes the semi-indurated with a bluish mineral substance, like the va- ıted ore of copper.

MOLYBDENA.

Molybden first obtain'd in masses small.
Agglutinate, in colour yellow white,
But grey within, and brittle too, of small

The specific gravity of the acid of moly
according to Bergman is 3.46: that of the
itself is not known according to Haüy. Hith
has only been obtained in small detached g
The sulphuret of molybdena, or molybdenite m
lised by sulphur of Kirwan, is easily scratch
the knife, and is composed of separate plates,
ble but not elastic, that are greasy to the
stains paper of a metallic grey colour, and
greenish streaks on delfe, or porcelain. It
heavier after some days emersion in water acc
to Kirwan. Its chymical character is its vol
by which it evaporates in white smoke by the
of the blow-pipe, and smells sulphureous. M
dena differs from plombago in its foliated te
that of plumbago being granulated. M. by t
tion is reduced to very thin plates, P. to p
when pounded in a mortar. Molyb. marks
with a greenish streak, P. leaves a streak of i

Metallic lustre, resists the magnet's
Power, and in water plung'd acquires new weight.

SCHEELE.

This metal yields in weight to platina
And gold alone, internally steel grey,

---

colour on porcelain. M. communicates to sealing-wax positive electricity, P. gives it none at all. The sulphuret of molybdena had been a long time confounded with plombago, and sometimes considered as an ore of zinc, a micaceous iron, or a variety of mica, or talc, by its crystals and its unctuosity.

The new metal tungsten means heavy stone, which Werner changed to scheele in honour of the person who had rectified the mistake occasioned by its ancient appellation. The analysis of this substance by Scheele under the name of tungsten, supposed to be white tin, showed him that it was made up of lime and another yellow colouring principle, which he considered in the light of a peculiar acid. Bergman thought that this acid was owing to a metal which the Spanish chymists D'Elheujar confirmed,

And of metallic lustre, brown without,
In form of globules, though brittle, pond'rous.

TITANIUM.

In Boinik's Schorl, and in Menachanite
The oxyd of Titanium's found; as yet

---

who in their examination of wolfram found the same principle that Scheele had discovered in the mineral, called white tin, and brought out the metal contained in that principle. The specific gravity attributed to tungsten by the Spanish chymists had not been confirmed by the French in the year 1801, but there is little reason to doubt of its accuracy.

The first appearance of this metal of titanium of Klaproth was in consequence of some experiments made by Mr. Gregor, some years ago upon a substance in the form of grains found in the vale of Menachan in Cornwall, composed of the oxyd of the metal in question, mixed with a certain portion of iron. Mr. Gregor suspected that it contained a peculiar metallic matter. Klaproth having since found that what was pretended to be schorl of Hungary was really the oxyd of a new metal, dis-

No art has to a regulus reduced
This novel ore.

TELLURIUM.

Tellurium 'neath the blow-pipe ardent burns,

---

covered the same oxyd in the menachanite, containing 45.25 of the oxyd of titanium, 51 of magnetic iron, 3.5 of silex, and 0.5 of the oxyd of manganese.

The grand vase of Sievres China in the gallery of the museum of pictures at Paris, called the cordelier, is coloured by red schorl, or oxyd of titanium, which for a long time was only employed to give the brown colour to the porcelain of that manufacture.

During the volatisation of tellurium it diffuses a smell of radishes as it is described by the chymists, the mass remains in its liquid state for some time, and as it cools, grows radiant on its surface, provided the heat be discontinued before it is completely volatised. The colour of the nitric acid in which it is soluble is not disturbed during the solution, but remains clear. Although tellurium may be found

In colour blue, and near its edges green.
Then in white smoke evaporates, and smells.

CHROME.

Chrome in Siberia's ruby lead was found
By Vauquelin first.

---

no doubt in a native state in the earth, yet hitherto it has always been attached to gold or silver, or other metallic substances. The matrix of this metal is quartz, and lithomarge. That variety known by the name of gold of nagyac in Transylvania is found with siliceous ore of manganese of a red rose pale, and a white colour.

VAUQUELIN and MACQUART made a course of experiments in order to determine the nature of the red lead of Siberia, and among other products obtained a green matter the colour of which they thought shewed the presence of a particular metallic substance in union with the red lead. The metal itself is of a greyish white colour, in the form of small crystals barbed like feathers, or needles crossing each other in different directions, very brittle and difficult to fuse. Under the blow-pipe it acquires

iolet crust, turning to green as it cools. nitric acid alone can act upon it, or is the acid that affects it in any remarkable . Mr. Vauquelin found Chrome in the red lead iberia, which he considered as composed of the i of this metal, combined with oxyd of lead.

Babington.

TANTALIUM.

'HIS metal has been found in the mineral called lolinite, and also in a species of tin ore, or oxyd in, in German Zingraupen.

a the first, tantalite is combined with oxyd of , and manganese, in the second with yttria, both ur in abundance in Sweden. Tantalite is not ible in any one of the acids, and only acted n by the alkalies. Its specific gravity is 6.500. ts weight, and other properties have made . Ekeberg consider it as a new metal.

'antalite is distinguished from the oxyd of tin by g easily reducible by heat; it might indeed be founded with this oxyd, because tin resists also action of acids; but then it requires a great t to reduce it even imperfectly.

'he oxyd of tungsten is soluble in ammonia, but talite is not.

'hosphate of soda and ammonia are coloured by

fusion with the oxyd of titanium, yellow, or hyacinth, with the oxyd of tungsten blue; but the oxyd of tantalite fuses with these salts into a colourless glass. See Accum's Chymistry.

PALLADIUM.

——— Corpore mirum est
In noto latet ignotum, æternumque latebit,
Si non eluitur lympha, aut exuritur igni.

A new metal is described at length in Mr. Nicholson's excellent journal, that has been imitated by Mr. Chenevix with platina and mercury, in an amalgamation, of which the specific gravity is less than the least weight of the component substances; and what is more singular, in this mixture, mercury whose affinity for caloric had hitherto baffled all attempts to destroy its volatility, could, when combined with platina become as fixed as any metallic substance chymistry has any knowledge of.

Palladium with one third of mercury is in specific gravity 11.5. The French say that it is not platina, but the new metal of palladium which, combined with mercury composes palladium, but there must

ave been platina in Mr. Chenevix's palladium, as e tells us that he took the metal reduced from the ed and yellow salts indiscriminately. Descotils has lso discovered a new metal in the ore of platina, nd it is presumed, that palladium may be an alloy f this new metal with mercury.

IRIDIUM,

A new metal found in crude Platina by Smithson Tennant, Esq.

On analysing the black powder which remains fter dissolving platina it appeared that the powder ontained two new metals, which were first observed y Mr. Tennant, and one of these was found afterards in France by Monsieur Descotils, and also by Ir. Vauquelin. According to the French chymists idium reddens the precipitate made by sal ammoniac; econdly, it dissolves in the marine acid; thirdly, it precipitated by galls, and prussiate of potash. ccording to Mr Tennant it is dissolved in all acids, ut least in the marine, with which it forms octoheral crystals. The name of iridium has been given this new metal for the variety of colours it exhiits in solution.

The second metal found in platina is obtained by

beating the black powder with pure alkali in a silver crucible. The oxyd of this metal unites with the alkali and may be expelled by an acid obtained by distillation, being very volatile. The oxyd has a strong smell, whence its name of osmium, or still better, osmia.

CERIUM,

A new metal found in a mineral substance from Bastiras in Sweden, by W. D'Hesinger, and T. B. Bergelius. The mineral itself was found 50 years ago in a hornblende matrix, and with other substances, and from its weight called tungsten or heavy stone; tumm stein.

The new metal cerion gets its name from the planet Ceres, we are told, discovered by Mr. Piazzi, in that case it should have been cererium, cerion means favus only from Κηρίον in Greek.

The new metal cererium forms with borax in the blow-pipe a globule first green when hot, then colourless when cold; it is not dissolved by carbonate of soda in a platina-spoon.

COLUMBIUM,

Is a new metal found by Mr. Hatchett in a mineral sent by Mr. Winthrop to Sir Hans Sloane from Massachusets bay, probably from the iron mines of that province. Colour, dark brown grey exterior; interior, iron-grey. Amorphous of a glassy hue inclining to metallic lustre. Fracture, lengthways imperfectly lamellar. Crossways finely grained, rather hard, and very brittle. Powder of a deep chocolate. Specific gravity at temp. 65°.5.5.918. Not attracted by the magnet. Not unlike chromate of iron from Siberia.

The ore found in this mineral consists of iron combined with an unknown substance, which constitutes more than three fourths of the whole. This substance is proved to be metallic in its nature, by the coloured precipitates which it forms with prussiate of potash and tincture of galls; and under the blow-pipe is difficult of reduction, on account of its obstinate retention of oxygene. It is also an acidifiable metal by reddening litmus paper with its oxyd, and yet remains white when digested with nitric acid. See Philosophical Transactions, p. 49—1802.

RHODIUM,

Found in Crude Platina.

A new metal so called from the rose-colour of a dilute solution of the salts containing it by Mr. Wollaston, who also in the same paper of the Philosophical Transactions for 1804—p. 419, states the results of various experiments which have convinced him, that the metallic substance which was offered for sale at Mrs. Foster's in Gerard-street, by the name of palladium, is contained, though in very small proportion, in the ore of platina.

SUPPLEMENT

TO PART I.

OR

SHORT CHARACTERS OF

EARTHS.

Published 1805.

MOROXIT.

The green colour of this earth is very remarkable, but always changeable, the most common is a dark grass-green, but sometimes it imitates an emerald, a leek, a finch, a pistacho-nut, or asparagus-green, this last but rarely; sometimes a muddy sky-blue mixed with grey, brown, or red, and now and then black or red.

The form of the crystal is a six-sided column pointed at one end or at both, the corners are

rounded, and sometimes truncated. The surfaces in all are smooth, and in some appear as if they had been fused. The size of the crystal varies, and is for the most part very small; the larger are scarce, and still more so when of a clear colour, and oftener short and thick than long and taper.

The fracture of this mineral is foliate, breaking into indefinite sharp angular pieces.

The best crystals are transparent, they are almost as soft as calcareous spar, and scratched give a greyish streak.

Moroxit is very brittle and cracks readily.

Feels cold to the touch.

The specific gravity of the largest crystal is 3.035.

According to Abilgaard's analysis it is composed of

Lime	60.000
Alumine	20.000
Magnesia	4.00
Carbonic acid	4.00

In nitric acid it loses its colour, grows white and opaque, and soon dissolves without apparent effervescence. Under the blow-pipe its colour flies; but the transparency remains without the least sign of

dissolution. With borax it melts to a milk-white opaque enamel.

Hitherto this mineral has been found in the iron mines of Arendal. The name is from μόρυξος of Galen, called μόρυχθος by Dioscorides, an Egyptian stone used in the bleaching of linen. Gal. Simp. Med. l. 9. Dioscor. lib. 1. c. 152.

Gabbronit passes from a bluish grey to a leek-green, very faint and almost without effulgence.

Its fracture is thick, even, and conchoidal, though sometimes a little splintering like hornstone, the fragments are irregular and angularly sharp. In pieces von 3 linien dicke it is hardly transparent, but at the corners clearly so.

It is more than half hard, but not hard enough to strike fire with steel, and may be scratched with the knife; by trituration it gives a white powder, is not brittle, nor particularly cold to the touch, somewhat meager to feel, but yet greasy.

The specific gravity is 2.947. Under the blow-pipe it loses its colour, and becomes white and melts in the flame, first at the edges, and then all over to an almost opaque enamel, with borax to a clear enamel full of bubbles.

The resemblance which this mineral has in colour to one found in great abundance in Italy, and which

was shewn to me by the late Mr. Abilgaard, under the name of gabbro, has been the occasion of my giving this stone the same appellation.

Schumacher.

ALLOCHROIT

Is of a yellowish gray, an olive-green, or straw-colour; of a slaty schistose appearance in amorphous broken masses—and looking like hard and stony asbestos.

It has very little splendor, except in pieces fresh broken, where it is of the brightness of wax and streaked.

The fracture of Allochroit is uneven, of a fine grain when very thick.

It strikes fire with steel, but with difficulty.

It is very hard to split.

The specific gravity of this mineral is.. 3.506
In some specimens..... 3.587
In others mixed with grains of iron.... 3.751

Vauquelin's analysis is

Silex	35.00
Lime	30.50
Carbonic acid	6.00
Alumine	8.00
Oxyd of iron	17.00
Manganese	3.50

The blow-pipe has little effect upon it, and borax alters it but little. With microcosmic salt it gives an enamel which varies from green to yellow, and passes into white when cooled, indicating the presence of a metallic substance. It is found in Virum's iron mine, near Drammen in Norway.

This mineral gets its name from its variety of colour in one and the same specimen.

ANTHOPHYLLIT

Is of the colour of a clove-gilliflower.

Exists in solid masses.

Viewed laterally has a strong gloss upon it.

Broke lenthways it is radiant; across uneven and imperfectly conchoidal.

The sharp angles and the broken splinters are transparent, elsewhere opaque.

It is scarcely hard enough to strike fire, but with difficulty scratched by the knife, giebt am stahl nur wenige funken; läst sich kaum mit dem messer ritzen, und giebt ein weisses pulver.

It is hard to divide or split, it breaks off in light sticky pieces. It feels rough and sharp, but not very cold.

Specific gravity is 3.118. Under the blow-pipe it

lies quiet, turns to a greenish black, loses its colour, and becomes soft, but does not fuse, except with borax, and then but a little, changing to a greenish yellow.

This scarce mineral is found in Norway, and near Konsberg. The name has been given to it on account of its colour. The right name is antholite. Anthophyllite does not mean what is here intended, the flower-stone, but the flower-leaf-stone.

FUSCIT

Is found of a greenish black colour, and sometimes of a greyish yellow.

The form of the crystals is a four-sided column, which is more or less truncated at the corners, and not uncommonly is found with six sides, and now and then by reduction of the angles nearly cylindrical.

These crystals are of various sizes, very small, and moderately large. Their surfaces are seldom entirely smooth, sometimes striped lengthways, but rarely furrowed, sometimes crossed obliquely by irregular lines.

This mineral appears in single and detached crys-

tals, and in groups growing together, and through one another.

The lustre of its exterior appearance is faint, and somewhat rather greasy, of its interior weak and dull.

The fracture is uneven and finely grained, opaque and hardly transparent at its acutest angles. It may be scratched by the knife as easily as talc, gives a whitish-grey streak, and a powder of the same colour.

The specific gravity of this substance is 2.500 to 3.000. Under the blow-pipe it lies still, and gives no sign of change, and appearing to dissolve grows much harder. With borax it melts in part to a semi-transparent olive-green enamel.

It has been found at Kallerigen near Arendal in white grained quartz, accompanied with a little feld and pearl-spar, usually in broken detached pieces.

The description which Mr. Lenz gives of fuscit in his Mineralogical Manual agrees so well with the substance I have been describing, that I consider it as related to fuscit, and have called it by one and the same name.

HEPATIT.

GRAINY HEPATIT.

Is either of a greyish-white, or a dark grey colour interwoven one with the other, compact, and tolerably bright.

Fracture uneven and rather foliated, and coarsely grained; opaque and transparent in small angular bits; somewhat hard, giving a white streak when scratched; not easy to divide, but brittle.

When rubbed against a hard body has a smell of burning, specific gravity is 4.132.

ACTINOSE HEPATIT,
or Radiating.

Actinose Hepatit is of the same colour with the former that marbles or runs together in veins.

The fracture of this sort is foliated, and in two directions running large in one, and radiating, and a contrary way to the other; the surfaces of the fragments are concave and convex. The large pieces have a wedge-like appearance. The specific gravity is 4.310, in other respects resembling the former. Both sorts are found in the mines of Konsberg;

Der Kornige auf New Seegen Gottes, and Herzog Fridericks Grube;—Der Strahlige auf Samuel Nye legten Grube. In both also appear, though rarely, accompanied with pure native silver, and asbestos.

CRYOLITE.

Fluate of Alumine and Soda is insoluble in water, and melts in the flame of a candle. Its specific gravity is 2.949, harder than sulphate of lime and softer than fluate.

In small bits when put into water, it grows transparent, and has a gelatinous appearance. Its primitive form is an octohedron or rather a rectangular prism. It has been analysed by Klaproth, and contains,

Soda.....36
Alumine.....25.5
Fluonic acid and water.....40.5

By Vauquelin.

Soda.....32
Alumine.....21
Fluonic acid and water.....47

This mineral was found in Greenland by a missionary who carried it to Copenhagen, when

Mr. Abilgaard analysed it, and found that it contained the fluoric acid that had never before appeared but in the fluate of lime. Cryolite is the name that Mr. Abilgaard gave this substance on account of its melting like ice, the ice-stone, or cryolite.—A name well adapted to its appearance, which is that of congealed water.

Its resemblance to the diaspora of Haüy ought to be noticed, which put into the flame of a candle flies immediately into a number of sparkling fragments in every direction; the resemblance is in the rapidity with which this is dissipated, and the other melted in the flame. The diaspora is like the hydrate of Argill, or aluminite, which is composed of three parts in four of alumine, and the rest of water. The diaspora holds

Alumine..... 80
Water..... $17\frac{1}{2}$
Iron..... $2\frac{1}{2}$

COCCOLITE.

This substance appears in masses of grains of a blackish green colour, and sometimes of a leek, and grass-green sticking loosely together, and separable by the pressure of the thumb and finger. It is said

r the Germans to be crystallised in four-sided right-
ıgled prisms, and in six of which both ends are
ointed, and the sides unequal and the solid angles
faced. The crystals of coccolite are rare. Diese
rystalle sind nicht häufig, and gerne in blatterigen
alkstein eingehüllt. Schumacher 4to. 1801. p. 30.
le adds also what I have already mentioned, von den
ornigen, trifft man zuweilers stücke die mit den fingern
eicht getreunt werden könners. The specific gravity
f coccolite is, 3.315. The elements, according to
'rof. Abilgaard, and Vauquelin, are as follows:

A.			V.		
	Silex.....	51		50...	Silex
	Lime.....	23		24....	Lime
	Magnesia...	9		10....	Magnesia
	Alumine....	2		7....	Oxyd of Iron
	Iron.....	6		3....	Manganese
	Manganese..	5		1.5	Oxyd of Alumine
	Water.....	3		4.5..	Loss.

Before the blow-pipe coccolite melts; but without hanging colour, except the leek-green sort which urns somewhat yellow, without loss of brightness, r transparency. It resembles pyroxene, and so closely allied to it, says Schumacher, that is augit, he pyroxene of Haüy, as to make one article; found in the iron mines of Arendal, and those of Ulve.

SAHLIT

Is composed of lamina of a bluish-grey colour, does not strike fire with the steel, and hardly scratches glass. Its specific gravity is 3.2368. It melts and swells under the blow-pipe. The crystals of this substance are bright green, and resemble the variety of pyroxene perioctaedre of Haüy. By Vauquelin's analysis,

Silex	53
Lime	20
Magnesia	19
Alumine	3
Iron and Manganese	4

Found in the silver mines of Sala in Sweden.

SPODUMENE,

In lamellar masses of a greenish-white colour, divisible into a rhomboidal prism of 100^d and 80^d, which is subdivisible in the direction of the diagonals of its bases. Spodumene scratches glass, and gives sparks with the steel.

Analysis.

Silex..... 56.0
Alumine..... 24.0
Lime..... 5
Oxyd of Iron..... 5
Loss..... 9.5

Spodumene means strewed with ashes. The specifie gravity is 3.218.

NEPHELINE.

This substance is found in the green volcanic scoria of Vesuvius, its weight is specifically 3.2741, hardly scratches glass. Its crystallised figure a six-sided prism of a clear glassy white. Its fracture conchoidal. In the nitric acid it grows nebulous, or cloudy, whence its name.

Analysis of Vauquelin.—

Silex..... 46
Alumine..... 49
Lime..... 2
Oxyd of Iron..... 1

APHRIZIT

Is a variety of tourmaline, and described by Dand as a particular species—black and opaque, weig specifically 3.1481, sparkling when struck by steel, and crystallising in short six-sided pri ending in a point with four facets, and not elec by heat; froths with borax; whence comes its G name. If this be so, it differs essentially in points from tourmaline, and cannot be a variet that substance, which is always electric by h and never crystallised in prisms with four-s summits.

BERGMANNIT

Is found of a dark grey mixed with a greyish fl red colour.

Its form is compact, and amorphous; it has little exterior splendour; some pieces of it incrusted with a greyish-yellow ochre; the inte has more lustre, and is somewhat greasy.

The fracture is very uneven, and rather splint and laterally in a star-like form, and foliated, an parts grainy.

The fragments are indefinitely angular, and transparent only at the edges. Gives a white streak, hardly strikes fire, splits with difficulty. Specific gravity is 2.300. Does not froth, lies still under the blow-pipe, but when heated quite through it appears phosphorescent in single points, and by increase of fire melts into a semi-transparent enamel. Acids have no effect upon it.

It has been hitherto found at Friedenchsvärn in Norway, accompanied with compact flesh-coloured felspar.

As this mineral does not appear to belong to any known genus, as it cannot be said to be a species of Kirwan's Adelit, Schumacher thought he could not do better than to perpetuate the memory of the late Mr. Bergman by giving it his name.

CONIT

Is of a greyish white colour, of weak lustre, and somewhat greasy, with shining points, or dots on its surface. Its fracture is like that of horn-stone—transparent at the edges, and much harder than limestone; specific gravity 2.830. This mineral has the singular property of effervescing with acids, and striking fire with steel. It comes from Iceland, and is called by Schumacher, after Professor Rezius's mineral, Conit, because it appears to be a similar substance.

DATHOLITE.

This mineral has 23½ per cent of boracic acid, and in this particular resembles the kryolite, and the natrolite, which are the only three minerals that contain this acid.

ZIRCONIT

Is of the colour of a clove-gilliflower, and at times of an hyacinthine red, and found in red felspar and amphibole, and blue labrador, of which the writer has a specimen, at Friederichsvern in Norway, where it passed under the name of vesuvian, or idoerase, but is a variety of zircon in Haüy, called la soustractive.

ADDITIONAL NOTE

To Carbonate of Lime, called Deception—Sugar.—See part 1st. Earths—Carbonate of Lime.

The confused crystallisation of carbonate of lime in this variety may be compared to that in loaf sugar, which is to the crystals of sugar-candy what white marble is to calcareous spar decidedly crystallised. Marbles have been called salt, on account of their resemblance to salts irregularly crystallised, but sugar is a better appellation.

ADDITION.

MURIACITE, or scaly gypsum is from the Tyrol, and consists of lime, and muriatic acid, according to Pere Poda, but by the analysis of Klaproth, it contains,

Muriate of Soda.....	31.2
Sulphate of lime.....	57.8
Carbonate of lime.....	11.0
	100.0

The muriate of soda gives it a violet-blush; it is divisible like rock-salt parallelly to the faces of a cube, and has its taste; but is not soluble, according to Fichtel, except in a quantity of hot water 4300 times its own weight.

TABLES OF MINERALS,

Arranged according to their

GENERA, SPECIES, VARIETIES, SPECIFIC GRAVITIES, PRIMITIVE CRYSTALS, AND COMPONENT PARTS;

After the

GERMAN, FRENCH, AND ENGLISH MINERALOGISTS.

TABLES OF MINERALS.

EARTHS.

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
CARBONATE OF LIME, divisible into rhombs. De Lisle, Tom i. page 497. Sowerby, Tables 3. 20.	Bergmilch Spongy	.....	Calx *combined with fixed air.*
	Chalky	2.250 Muschenbroek 2.657 Watson	Lime 53, Alumine 2, fixed air 42, water 3. Kirwan.
	Common	1.3864 to 2.72. Kirwan	Lime, carbonic acid, water with one half per cent. alumine. Kirwan.
	Massive	.....	.....
	Marble	2.456 Kirwan	Mild calx 90, alumine 10, some iron. K.
	Carrara, *fine*	2.707. Muschenb.	Lime 52, alumine 3, carbonic acid 45, water. Kirwan.
	Saxonic	2.849. Gellert	.....
	Foliated	2.700. Kirwan	Lime 55, carbonic acid 45, and water. Kir.
	Iceland, *coarse*	2.700. Muschen	.....
	Radiated		.....
	Fibrous	2.3—2.8. Brisson	Lime 64, carb. acid 34, water 2. Bergm.
	Scaly	2.396. Wiedemann.	
ARGENTINE	.....	2.647. Kirwan	
SCHAUMERDE, *foamearth*, *Ecume de terre.*	.....		Lime and fixed air.

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
STANGELKALK	.....	2.861.....	Lime and fixed air.
ARAGONITE, crystallised in hexhedral prisms, Pl. 85, fig. 232, Haüy	.....	2.896. Wiedemann	Lime, carbonic acid, water. Klap.
APATIT C. hexhedral prisms. Haüy, Pl. 30, fig. 66.....	Common.....	.....	Lime 59. silex. 2. iron 1, phos. ac. 34, fl. ac. 2.56, car. ac. 1, ac. of salt 0.50. Pelletier.
	Mescheliger, *Asparagus stone*.....	3.98. Werner.....	Lime 54.28. phosph. acid. 45.72. Vauq.
	Foliated.....	2.218. Gellert.....	Lime 55, phosph. acid 45. manganese. Kl.
	Massive.....	3.150.....	.....
FLUOR. C. Octohedral. Haüy. pl. 31. fig. 74. De Lisle, T. 2. p. 15. Sowerby, T. 11.	Earthy.....	.....	L. 21, sil. 31, alu. 15.50, iron 1, fl. ac. 28.50, phosph. acid 1. Pelletier.
	Solid	3.12—3.165. Kir.	Fl. acid 41, water 13, lime 12. Fuchs.
	Foliated { fine	3.092. Gellert.....	L. fluor. acid, water. Scheele.
	Foliated { coarse	3.181. Blumenb.	
GYPSUM. C. decahedral. Haüy. Pl. 33. fig. 94. Sowerby. T. 67	Earthy.....	.....	Lime and sulphuric. acid
	Compact	1.872. 2.285.....	L. 32. sulphr. ac. 30. water 38. Kirwan.
	Foliated { fine	2.274 2.310. Kirwan	.....
	Foliated { coarse	2.301. Kirwan.....	Lime 32. sulph. acid. 46. water 22. Bergm.
	Thready.....	2.305. Blumenb....	L. 25, sul. ac. 46, water 25, ox. iron 2. Fuchs.
SWINESTONE.....	Compact.....	2.699.....	.....
	Grainy	.....	.....
	Foliated.....	2.701. Kirwan.....	L. 50, car. ac. 45, and a little petroleum. K.
BITTER SPAR. C. in rhombs like Carbonate of lime.....	.....	2.480. Klaproth....	Lime, car. acid 52, mag. 45, man. 3, and oxid iron. Klaproth.

Mergel, Marl	Common	1.600.—2.4. Kirwan	Carbon. acid 60, lime with alumine
	Indurated	2.3.—2.7. Kirwan.	.....
	Schistous	2.3.61. 2.442. Kirwan	Carb. acid, lime, alumine and bitumen. Kir.
	Bituminous	.....	.....
Conit (shining faintly or dead, with changeable points)	.....	2.829	(With the fracture of hornstone.)
Moroxit C. hexedral prisms	.....	3.035.—3.091	L. 60, alumine 20, magn. 4, carb. ac. 4. Abil.
Baryto-calcite C. tetrahedral prisms	.....	2.78. ? Kirwan.....	Aerated calx 92, barytes 8. Kirwan
Pearl Spar, C. rhomb. H. pl. 23, F. 1. De Lisle, T. iii. p. 283	.....	2.837. Brisson..... 2.396. Kirwan.....	Carb. ac. lime, 50, mang. 28, iron 22. Berg.
Boracite. C. dodecahedral, Cube prim. form. Haüy. pl. 33. fig. 91	.....	2.076—3.467. Heyer	Magnesia 13.50, lime 11, silex 3, alumine 1, iron 0.70, boracic acid 68. Westr.
Chrysolite C. parallelopepid, right-angled, H. pl. 42 and 25	.....	3.340. Werner and Kl.	Magnesia 43.50, silex 39, iron 19. Klap.
Meershaum, *red pipe-earth*	.....	0.336. Gross..... 1.600. Klaproth	Silex 41.50, magnesia 18.25, lime 0.50, carbonic acid 39, water. Klaproth.

				iron 7.50. Bergmann
BARKALITE. C. tetrahedral hexedral piramids oblique, octohedral	.....	2.200.	Blumenb....	Silex 44, magn. 30, lime 20, iron 6. Lowitz
OLIVIN. C. hexhedral. Haüy. fig. 198. pl. 60	Common.....	3.032—3.403	.....	Silex 50, magn. 38.50, lime 0.25, iron 12. Kl.
	Foliated.....	.....	.....	.....
VESUVIAN. C. tetrahedral, fig. 69, p. 47. Haüy	.....	3.365—3.390.	Klap.	Silex 35.50, lime 33, alumine 22.25, iron 7.50, manganese 25. Klaproth
AUGITE. Form. prim. fig. 138, pl. 54. Haüy. oblique prism, with rhombic bases.	.....	3.480	Weidem. ...	Silex 52, lime 23, magnesia 10, alum. 3.83, iron 14.66, manganese 2. Vauquelin
COCCOLITE.....	.....	3.316.	D'Andrada.	Sil. 51, l. 20, mag. 19. al. 3, iron 4, man. 8, Ab.
				Sil. 50, L. 24, magn. 10, iron 7, mang. 3, alum. 1, loss 5. Vauquelin
SATHLITE. C. like augite	.....	3.2368.	D'Andrada	Silex 53, lime 20, magn. 19, alumine 3, iron and manganese 4, loss 1. Vauquelin
ALTOCHROITE.....	.....	3.5754.	D'Andrada..	Sil. 35, lime. 30½, carbonic acid 6, alum. 8, oxyd of iron 17, manganese 3½. Vauq.
TREMOLITE. C. prism, oblique with rhomb. bases, p. 61, f. 213. H.	Common.....	3.000.	Wiedeman...	Silex 52. pure lime 20, carbonic acid 12, manganese 12, and a little iron. Lowitz
	Glassy	.....	.....	s. 65, l. 18, m. 10.33, ir. 0.16, c.a. & wat. 6.50. K.
SMARAGDITE.....	.....	.....	.....	Silex 50, lime 13, alum. 11, magnesia 6. chrome 7.50, iron 5.30, copper 1.50. Vauq.

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
LASURSTEIN		2.045 *(Siberian)* Bris. 2.772. Blumenb.	Silex 46, carb. acid 28, alum. 14.50, gypsum 6.50, iron 3, water 2. Klaproth
LAZULITE			Silex, alumine, iron. Klaproth
INDICOLIT, from Hungary			
LEPIDOLITE		2.816. Klaproth	Silex 54.50, alumine 38.25, kali 4, manganese and iron 0.75. Klaproth
MICA, C. hexag. tables, prisme droit, with rhombic bases. Haüy. pl. 60, fig. 205		2.767. Kirwan	Silex 50, alumine 35, magnesia 1.35, lime 1.35, iron 7. Vauquelin
ZEOLITE, C. prisme droit, with square bases. H. pl. 58, fig. 172. Sowerby. tables 57. 8.9	Mealy		Silex 50, alumine 20, lime 8, water 22. Pell.
	Grainy	1.841, red. 2.041. green	
	Compact	2.277	
	filamentous, fine (hair)		Silex 40.98, alumine 31.09, lime 10.95, water 16.50. Meyer
	filamentous, coarse	2.162. Wiedem.	
	Radiated	2.063. white, 2.486. red. Brisson	Silex 50.24, alumine 29.30, lime 9.46, water 10. Vauquelin
	Foliated	2.199. Wiedem	Silex 52, alumine 17.50, lime 9, water 18.50, Vauquelin
KOUPHOLITE, light stone in transparent tables			

Bergmannit, amorphous dark grey		2.300		
Prehnite, C. rhomb		2.943.	Brisson	Silex 43.80, alumine 30.33, lime 18.33, iron 5, water 1. Klaproth
Kieseltuf	Compact / Spongy			Silex 98, alumine 1.50, iron 0.50. Klap.
Pumice-stone, bimstein		0.904.	Blumenbach	Silex 77.50, alumine 17.50, iron 1.75. Klaproth
Lithomarga, steinmark	Friable / Indurated	2.815.	Kirwan	Silex 46, alumine 47, iron 3, lime 2. Fuchs.
Chiastolite, C. prismatic quadrangular, pl. 61. Haüy, fig. 219. Sowerby. Table 96		2.9778.	Karsten, mineral tables 1800	
Steatite, agalmolite	Transparent	2.815.	Klaproth.	Silex 54, alumine 36, iron 0.75, water 5.50. Klaproth
Agalmolite, imagetalc, C. hexagonal, fig. 217, pl. 61. Haüy	Opaque	2.785.	Klaproth	Silex 62, alumine 24, lime 1, iron 0.50, water 10. Klaproth
Walkererde, Fuller's earth				Silex 51.80, alumine 25, magnesia 3, iron 70, water 11.50. Bergmann
Bole		1.4.2.	Kirwan	Silex 47, alumine 19, magnesia 6.20, lime 5.4, iron 5.40, water 17.50.
Thon, Potter's clay	Soft / indurated / Schistous	1 8.2. / 2.6.263.	Kirwan	Silex 68, alumine 37. Kirwan

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
CIMOLITE		2. Klaproth	Silex 63, alumine 23, iron-stone 1.25, water 12. Klaproth
PIMELITE			Silex 25, alumine 5, magnesia 1.25, lime 0.40, Nickel-earth 15.62, iron 4.38, water and loss 37.91. Klaproth
SKORSA		3.135. Karsten	Silex 43, alumine 21, lime 14, iron 16.50, manganese 0.25. Klaproth
GREEN-EARTH			Silex, alumine, iron, manganese. Meyer.
GELBERDE			
BRANDSCHIEFER		2. Kirwan	
ZEICHENSHIEFER		2.114. Kirwan	
MARKING SLATE		2.277. Brisson	Silex 64, alumine 11.25, coal 11, iron 2.75, water 7.50. Wiegleb.
ALUMINITE	Schistous	1.805. Wiedemann	
THONSCHIEFER, schistous argil		2.750—3500. Gmelin	Silex 38, alumine 26, magnesia 8, lime 4, iron 14. Kirwan
TRAP, wacke		2.535—2.893. Kir...	Silex 63, alumine 14, lime 7, iron 16
BASALT, C. a six-sided prism		2.014—3.310. Gmelin	Silex 50, alumine 15, magnesia 2, lime 8, iron 0,25. Bergmann
PORCELAIN EARTH			Silex 52, alumine 47, iron 0.33
TRIPEL		2.529. Kirwan	
EISENKIESEL, ironstone			Silex and iron karsten with some alumine
NOVACULITE		2.609. Kirwan	
LINT, C. in double trihedral pyramids		2.94. Blumenb. 2.63. Kirwan	Silex 98, lime 0,50, alumine 0.25, iron 0.25. Klaproth
PORCELLANITE		2.662. Wiedemann	Silex 60.65, alumine 27.25, magnesia 3, iron 2.50, kali 2.60. Roose

ACTYNOLITE. C. hexhedral	Glassy	2.950.	Kirwan.	Silex 72, magnesia 12.70, alumine 2, lime 6, iron 7.30. Bergmann
BARKALITE. C. tetrahedral hexedral piramids oblique, octohedral		2.200.	Blumenb.	Silex 44, magn. 30, lime 20, iron 6. Lowitz
OLIVIN. C. hexhedral. Haüy. fig. 198. pl. 60	Common	3.032—3.403		Silex 50, magn. 38.50, lime 0.25, iron 12. Kl.
	Foliated			
VESUVIAN. C. tetrahedral, fig. 69, p. 47. Haüy		3.365—3.390.	Klap.	Silex 35.50, lime 33, alumine 22.25, iron 7.50, manganese 25. Klaproth
AUGITE. Form. prim. fig. 138, pl. 54. Haüy. oblique prism, with rhombic bases.		3.480	Weidem.	Silex 52, lime 23, magnesia 10, alum. 3.83, iron 14.66, manganese 2. Vauquelin
COCCOLITE		3.316.	D'Andrada.	Sil. 51, l. 20, mag. 19. al. 3, iron 4, man. 8, Ab. Sil. 50, L. 24, magn. 10, iron 7, mang. 3, alum. 1, loss 5. Vauquelin
SAHLITE. C. like augite		3.2368.	D'Andrada	Silex 53, lime 20, magn. 19, alumine 3, iron and manganese 4, loss 1. Vauquelin
ALTOCHROITE		3.5754.	D'Andrada.	Sil. 35, lime. 30⅛, carbonic acid 6, alum. 8, oxyd of iron 17, manganese 3⅛. Vauq.
TREMOLITE. C. prism, oblique with rhomb. bases, p. 61, f. 213. H.	Common	3.000.	Wiedeman.	Silex 52. pure lime 20, carbonic acid 12, manganese 12, and a little iron. Lowitz
	Glassy			s. 65, l. 18, m. 10.33, ir. 0.16, c.a. & wat. 6.50. K.
SMARAGDITE				Silex 50, lime 18, alum. 11, magnesia 6. chrome 7.50, iron 5.30, copper 1.50. Vauq.

Genus.	Species and Variety.	Specific Gravity.		Component Parts.
Opal	Effulgent	2.114.	Blumenbenb	Silex 90, water 10, Klaproth
	Dull	1.958.	Klaproth	Silex 93.50, water 5, iron 1, (accidental)
	Half	1.7.	Kirwan	Silex 82.75, alumine 0.25, lime 3, iron 10, water. Stücke
	Leber (Menelit)	2.185.	Klaproth	Silex 85, alumine 1, lime 0.50, water and coal 11. Klaproth
	Wood	2.08.	Kirwan	Sil. 78, alu. 11, lime 5, kupferkalk 10. Fuchs.
Pitchstone		2.314.	Blumenbenb	Silex 73, alu. 18, iron with water 5. Wiegleb.
Pearl-stone		2.424.	Wiedemann	
Perlstein				
Obsidian		2.348.	Kirwan	Silex 74, alum. 2, iron 14. Abilgaard
Marekanit				S. 74, alum. 12, magn. 3, lime 7, iron 1. Low.
Quartz	Common	2.486.	Muschenberg	Silex 92.42, magn. 2, lime 5.55. Guyton
	Milk	2.666.	Wiedemann	Silex 47, alu. 44, magn. 5, iron 2, Fuchs.
	Rock crystal	2.650.	Brisson	Silex 93, alumine 6, lime 1
Quartz, C. A. slightly obstuse rhomboid. Haüy, pl. 40, fig 4. Sowerby, tab. 41.	Amethyst	2.650.	Brisson	Silex 97.50, alumine 0.25, iron 0.50, and manganese. Roose
		2.750.	Werner	
	Prase	2.836.	Wiedemann	Silex 51.50, alumine 48.50. Fuchs.
	Gelenk, jointed			Silex 96.50, alumine 2.50, iron 0.50. Klap.
Axinite, divisible parallelly to the sides of a rhomboidal prism of 101d. $\frac{1}{2}$. and 78 $\frac{1}{2}$, fig. 105, pl. 51. Haüy		3.111.	Wiedemann	Silex 52.70, alumine 25.60, lime 9.40, iron and manganese 9.60. Klaproth
		3.233,	from Arendal	

Genus.	*Species and Variety.*	*Specific Gravity.*		*Component Parts.*
Bergmannit, amorphous dark grey	.....	2.300	.....	.....
Prehnite, C. rhomb	.....	2.948.	Brisson	Silex 43.80, alumine 30.33, lime 18.33, iron 5, water 1. Klaproth
Kieseltuf	Compact	.....	.....	Silex 98, alumine 1.50, iron 0.50. Klap.
	Spongy	.....	.....	Silex 77.50, alumine 17.50, iron 1.75. Klaproth
Pumice-stone, bimstein	.....	0.904.	Blumenbach	
Lithomarga, steinmark	Friable	2.815.	Kirwan	Silex 46, alumine 47, iron 3, lime 2. Fuchs.
	Indurated			
Chiastolite, C. prism. quadrangular, pl. 61. Haüy, fig. 219. Sowerby. Table 96	.....	2.9778. mineral tables 1800	Karsten	.....
Steatite, agalmolite	Transparent	2.815.	Klaproth.	Silex 54, alumine 36, iron 0.75, water 5.50. Klaproth
Agalmolite, imagetalc, C. hexagonal, fig. 217, pl. 61. Haüy	Opaque	2.785.	Klaproth	Silex 62, alumine 24, lime 1, iron 0.50, water 10. Klaproth
Walkererde, Fuller's earth	.....	.....		Silex 51.80, alumine 25, magnesia 8, iron 70, water 1.50. Bergmann
Bole	.....	1.4.2.	Kirwan	Silex 47, alumine 19, magnesia 6.20, lime 5.4, iron 5.40, water 17.50.
Thon, Potter's clay	Soft	1 8.2.	Kirwan	Silex 63, alumine 37. Kirwan
	indurated	.....	.....	
	Schistous	2.6.263.	Kirwan	

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
LENDE, C. hexal, tetrahedral, decahedral prisms, oblique with rhombic bases, pl. 54. fig. 132. Haüy.....	Common	3.600—4.880. Kirwan	Silex 37, alumine 22, magnesia 16, lime 2, iron 23. Kirwan
	Schistous	2 909—3.153. Kir...	.....
	Resplendent.....	3.35—3.434. Kirwan	Silex 52, alumine 23.33, lime 7, magnesia 6, iron 17.50. Heyer
	Basaltic.....	3.333. Kirwan.....	Sil. 58, al 27, lime 4, magn. 1, iron 9. Bergm.
ACANTICONE, C. hexhedral prism, pl. 55, fig. 151. Haüy....	.....	3.3000. D'Andrada	Silex 37, alumine 21, lime 15, iron 24. manganese 1.50 Vauquelin
THALLITE, C. prisme droit base oblique-angled parallelogram, Haüy, p. 103, vol. 3.	.....	3.4529.....	Silex 37, alum. 27, lime 14, iron 17, manganese 1.5.—Collet Descotils
SCHORL, Delisle, tom. 2, p. 397, C. trihedral exhedral prisme oblique, fig. 132, pl. 54. Haüy.....	Common	3.092. Brisson.....	Silex 41, alumine 38, iron 0.16
	Tyrolese	3.47. Müller.....	.....
	Effulgent Brazils	3.155. Brisson.....	Silex 40, alumine 39, lime 4, iron 12, manganese 2.50. Vauquelin
	Tourmalin Ceylon	3.054. Brisson.....	
ICHTYOPHTALMITE, oculus pisus.....	.....	2.491. D'Andrada..	.....
	.....	2.633. Norwegian, Schumacher	.....
ANTHOPHYLLITE.....	.....	3.118. Schumacher	.....
SCAPOLITE.....	Sticklike.....	3.680—3.708. D'An.	.....
	Pinitartiger.....	.....	.....
	Talclike.....	.....	.....
DIPURE, C. hexedral phosphorescent.....	.....	2.6305.....	Silex 60, alumine 24, lime 10, water 2

				Component Parts.
Beril of Siberia	Emulgent	2.775.	Brisson.	Silex 60, alumine 15, glycine earth 12.50, lime 0.25, iron 1, chromium kalk 0.25. Kl.
	Gestreifter, streaked sky-blue	2.683.	Brisson.	
		2.250.	Werner.	Silex 69.50, alumine 14, glycine-earth 14, iron 1. Rose
Kreutzstein *Cross-stone*, C. octohedral, with 3 equilateral angles, fig. 194, pl. 59. Haüy		2.353.	Heyer	Sil. 49, baryte 18, alum. 16, water 15. Klap.
Alumine		1.669.	Gmelin.	Alumine, carbonic acid, silex and lime
Kryolite divisible into rectangular prisms		2.9698.	D'Andrada	Alumine 23.50, natron 36, fluoric acid 40.50. Klaproth
Alaunstein Alum, C. octohedral		1.378.	Wiedemann	Alum. 21, natron 32, fluoric acid 47. Vauq.
Honeystone, C. octohedral, fig. 12, pl. 62. Haüy		1.524.	Wiedemann	Alumine 43.92, silex 24, sulphur. acid 25, sulphate of potash 3.80, water 4. Vauq.
Sapphire, C. hexhedral		3.950.	Klaproth.	Alumine 16, a peculiar acid 46, water 38. Kl.
Spinelle, C. octohedral		4—4.100.	Werner.	Alumine 98.50. lime 0.50, iron 1. Klaproth
Ceylanite, pleonuste de Haüy, C. octohedral, dodecahedral		3.570—3.590.	Klapr.	Alumine 82.47, magnesia 8.78, chrome 6.18. Vauquelin
		3.7647.		Alumine 68, magnesia 12, silex 2, iron 16. Collet Descotils

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
OPAL	Effulgent	2.114. Blumenbenb	Silex 90, water 10, Klaproth
	Dull	1.958. Klaproth	Silex 98.50, water 5, iron 1, (accidental)
	Half	1.7. Kirwan	Silex 82.75, alumine 0.25, lime 3, iron 10, water. Stücke
	Leber (Menelit)	2.185. Klaproth	Silex 85, alumine 1, lime 0.50, water and coal 11. Klaproth
	Wood	2.08. Kirwan	Sil. 73, alu. 11, lime 5, kupferkalk 10. Fuchs.
PITCHSTONE		2.314. Blumenbenb	Silex 73, alu. 18, iron with water 5. Wiegleb.
PEARL-STONE Perlstein		2.424. Wiedemann	
OBSIDIAN		2.348. Kirwan	Sliex 74, alum. 2, iron 14. Abilgaard
MAREKANIT			S. 74, alum. 12, magn. 3, lime 7, iron 1. Low.
QUARTZ	Common	2.486. Muschenberg	Silex 92.42, magn. 2, lime 5.55. Guyton
QUARTZ, C. A. slightly obstuse rhomboid. Haüy, pl. 40, fig 4. Sowerby, tab. 41	Milk	2.666. Wiedemann	Silex 47, alu. 44, magn. 5, iron 2, Fuchs.
	Rock crystal	2.650. Brisson	Silex 93, alumine 6, lime 1
	Amethyst	2.650. Brisson 2.750. Werner	Silex 97.50, alumine 0.25, iron 0.50, and manganese. Roose
	Prase	2.836. Wiedemann	Silex 51.50, alumine 48.50. Fuchs.
	Gelenk, jointed		Silex 96.50, alumine 2.50, iron 0.50. Klap.
AXINITE, divisible parallelly to the sides of a rhomboidal prism of 101d. 4. and 78 1/2, fig. 105, pl. 51. Haüy		3.111. Wiedemann	Silex 52.70, alumine 25.60, lime 9.40, iron and manganese 9.60. Klaproth
		3.233, from Arendal	

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
ALMANDINE, C. glassy quartz, black		4.085. Klaproth	Silex 35.75, alumine 27.25, iron 36, manganese 0.25. Klaproth
GARNET, C. 12 hedre rhomboidal, fig. 53, pl. 46. Haüy	Effulgent	3.713. Klaproth	Silex 40, alumine 28.50, magnesia 10.05, lime 3.50, iron 16.50, mang. 0.25. Klap.
		3.865 3.942 Greenlandish	
		4.018. Norwegian	
	Dull	3.754. Werner	Silex 36.45, lime 30.85, iron 28.75 Weigleb
	Schorlartiger	3.052	
MELANITE			Silex 43, lime 26, alumine 16, iron 16, water 4. Vauquelin
LEUCITE, C. cube, fig. 61, pl. 46. Haüy. Sowerby. Tab. 59.		2.455 Vesuvian 2.490 Albanese Kl.	Silex 53.75. alumine 24.62, kali 21.35, Klaproth
SPODUMENE		3.218. D'Andrada	
FELSPAR	Labrador	2.607. Brisson	
	Adular	2.550. Struve	Silex 76.82, alumine 8.66, lime 2.20
	Compact		
	Common	2.594. Blumenb	Silex 71, alumine 30. Some iron. Heyer
	Glassy		
WERNERITE, forme primitive presumeé. Haüy, fig. 165, pl. 57		3.6063. D'Andrada	

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
HORNBLENDE, C. hexhedral, tetrahedral, dodecahedral prisms, oblique with rhombic bases, pl. 54. fig. 132. Haüy.....	Common.....	3.600—4.880. Kirwan	Silex 37, alumine 22, magnesia 16, lime 2, iron 23. Kirwan
	Schistous.....	2 909—3.153. Kir...	....
	Resplendent.....	3.35—3.434. Kirwan	Silex 52, alumine 23.33, lime 7, magnesia 6, iron 17.50. Heyer
	Basaltic.....	3.333. Kirwan.....	Sil. 58, al 27, lime 4, magn. 1, iron 9. Bergm.
ACANTICONE, C. hexhedral prism, pl. 55, fig. 151. Haüy....	.....	3.3000. D'Andrada	Silex 37, alumine 21, lime 15, iron 24. manganese 1.50 Vauquelin
THALLITE, C. prisme droit base oblique-angled parallelogram, Haüy, p. 103, vol. 3.	.....	3.4529.....	Silex 37, alum. 27, lime 14, iron 17, manganese 1.5.—Collet Descotils
SCHORL, Delisle, tom. 2, p. 397, C. trihedral exhedral prisme oblique, fig. 132, pl. 54. Haüy.....	Common.....	3.092. Brisson.....	Silex 41, alumine 38, iron 0.16
	Tyrolese.....	3.47. Müller.....	.....
	Effulgent Brazils	3.155. Brisson.....	Silex 40, alumine 39, lime 4, iron 12, manganese 2.50. Vauquelin
	Tourmalin Ceylon	3.054. Brisson.....	
ICHTYOPHTALMITE, oculus pisus.....	.....	2.491. D'Andrada..	.....
	.....	2.633. Norwegian Schumacher	.....
ANTHOPHYLLITE.....	.....	3.118. Schumacher	.....
SCAPOLITE.....	Sticklike.....	3.680—3.708. D'An.	.....
	Pinitartiger.....	.....	.....
	Talclike.....	.....	.....
MIPURE, C. hexedral	.....	2.6305.....	Silex 60, alumine 24, lime 10, water 2

	Species and Variety.	Specific Gravity.		Component Parts.
Smaragd, emerald, C. hexhedral	Effulgent	2.775.	Brisson	Silex 60, alumine 15, glycine earth 12.50, lime 0.25, iron 1, chromium kalk 0.25. Kl.
Beril of Siberia	Gestreifter, streaked sky-blue	2.683. 2.250.	Brisson. Werner	Silex 69.50, alumine 14, glycine-earth 14, iron 1. Rose
Kreutzstein *Crossstone*, C. octohedral, with 3 equilateral angles, fig. 194, pl. 59. Haüy		2.353.	Heyer	Sil. 49, baryte 18, alum. 16, water 15. Klap.
Alumine		1.669.	Gmelin	Alumine, carbonic acid, silex and lime
Kryolite divisible into rectangular prisms		2.9698.	D'Andrada	Alumine. 23.50, natron 36, fluoric acid 40.50. Klaproth Alum. 21, natron 32, fluoric acid 47. Vauq.
Alaunstein Alum, C. octohedral		1.378.	Wiedemann	Alumine 43.92, silex 24, sulphur. acid 25, sulphate of potash 3.80, water 4. Vauq.
Honeystone, C. octohedral, fig. 12, pl. 62. Haüy		1.524.	Wiedemann	Alumine 16, a peculiar acid 46, water 38. Kl.
Sapphire, C. hexhedral		3.950. Klaproth 4—4.100. Werner		Alumine 98.50. lime 0.50, iron 1. Klaproth
Spinelle, C. octohedral		3.570—3.590.	Klapr.	Alumine 82.47, magnesia 8.78, chrome 6.18. Vauquelin
Ceylanite, pleonuste de Haüy, C. octohedral, dodecahedral		3.7647		Alumine 68, magnesia 12, silex 2, iron 16. Collet Descotils

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
CYANITE, C. oblique quadrangular prism	.....	3.517. Saussure....	Alumine 66.92, magnesia 33.25, silex 12, lime 1.71, iron 5.48. Saussure
STANGENSTEIN, *Stick-stone*	.....	3.530 Klaproth	Alumine 50, silex 50. Klaproth
SIBERITE, C. hexhedral	.....	3.048—3.100	Alumine 48, silex 36, lime 3, oxid mangan. 9, loss 3. Haüy
STAUROLITE, C. tetrahedral prisms, tetrahedral pyramids. Babington. F. P. octohedre. Haüy..	.....	3.2861..... 2.3333. Haüy.....	Alumine 47, silex 30, lime 3, iron 15. Vauquelin
PINITE.....	.....	2.9257.....	Alumine 63.75, silex 29, iron 6. Klaproth
KOLLYRITE.....	.....	.....	Alumine 45, silex 14, water 42. Klaproth
SOMMITE, hexhedral, fig. 192, pl. 59. Haüy.....	.....	3.2741.....	Alumine 49, silex 46, lime 2, iron 1. Vauq.
DIAMANTSPATH *Corundum*, rhomboids somewhat acute, fig. 96, pl. 50. Haüy	.....	3.8732..... 3—710. Chinese corun.	Alumine 89, silex 5, iron 1.25. Klaproth
TOPAZ, C. tetrahedral pyramidal, fig. 36. pl. 44. Haüy.....	.....	3.556. Werner..... 3.464. Brazilian....	Alumine 68, silex 31. Vauquelin
CHRYSOBERILL, C. rectangular parallelopepid, .25, pl. 42. Haüy	.....	3.710. Klaproth....	Alum. 71.30, sil. 18, lime 6, iron 1.50. Klap.

JARGON, C. octohedral with 3 equilateral triangles, figs. 9.11, p. 41. H. tab. 76. Sowerby	Red, *hyacinth*	4.4161.	Haüy	Jargon earth 70, silex 25, iron 0.50. Klapr.
		4.540.	Klaproth	
		3.687.	Brisson	
	Brown, *hyacinth*	4.416.	Brisson	Jargon earth 68, silex 31.50, iron 0.50. Klapr.
		4.700.	Werner	
		4.615.	Klaproth	
WITHERIT, carbonate of baryt C. hexhedral		4.271.	Lichtenberg	Baryt 78, carbonic acid 22. Klaproth
		4.338.	Withering	
BARYT, C. hexhedral prisms joined base to base, Anglesark. Lancashire	Earthy			
	Compact	4.3—4.4.	Kirwan	Baryt with sulphuric acid 83, silex 6, alum. 1, selenite 2, iron 4, water 2. Westrumb
	Foliated, *grainy*	4.380.	Klaproth	Baryt 60, sulphr. acid 30, silex 10. Klaproth
	Gross blatteriger	4.760.	Wiedemann	Sulphat baryt 97, with sulphat of strontian, iron, alumine, and water
	Sticky			
	Radiated, Bologna stone	4.440.	Blumenb.	
		4.496.	Muschenbr.	
HEPATIT				Heavy earth 29, silex 33, alumine 5, lime 3, with sulphuric acid and water. Klaproth
STRONTIANITE		3.675.	Klaproth	Stront. 69.50, carb. ac. 30, water 0.50. Klap.
SCHULZITE, sulphate of strontian	Compact			
	Fibrous	3.830.	Pensylvania.	Strontian 58, sulphuric acid 42. Klaproth
	Celestine		Klaproth	
	Foliated			Str. 54, sulphur. acid 46. Vauquelin

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
GADOLINITE		4.0497	Yttrian 59.75, silex 21, alumine 0.30, iron 18. Klaproth
MOLYBDENA, C. in hexhedral laminæ. Prisme droit, rhombic bases, pl. 83, fig. 215. Haüy.	Wasserbley	4.569—4.738	Molybden acid 60, sulphur 40. Klaproth
ARSENIC	Native	8.310. Bergmann	Arsenic &c.
	Silver		Arsenic 35, iron 44, silver 12, antimony 4. Klaproth
ARSENICKIES, C. tetrahedral prisms, pl. 75, fig. 135. Haüy	Containing arsenical pyrites. Weisserz	4.087. Kirwan	Arsenic iron 1—10, p. c. silver. Kirwan
	Common	5.753. Gellert	Arsenic 38, iron 19, sulph. 15, sil. 12. Vauq.
RAUSCHGELB, C. octohedral. Haüy	Yellow	3.521. Gellert	Arsenic 20, sulphur 80. Westrumb
	Red	3.225. Bergmann	Arsenic 80, sulphur 20. Westrumb
ARSENIC-LIME			Arsenic, sauerstoff and water
PHARMACOLITE			Lime with ac. of arsenic and a little cobalt. Kl.
SCHEELERZ, tungsten		4.990—5.800. Kir.	Scheel-acid 44, lime 56. Scheele
WOLFRAM, C. parallelopepid rectangular, fig. 226, pl. 85. Haüy		7.119. Kirwan	Acid of tungsten 66, iron 18, manganese 6. Vauquelin and Heckt
		7.130. Gellert	
IRON CHROME		4. Lowitz	Chromium-earth, iron with silex and alumine. Lowitz.

Genus.	Species and Variety.	Specific Gravity.	Component Parts.
Titanschorl, C. rectangular prism, p. 86, fig. 216. Haüy	Common	4.180. Klaproth	
	Foliated	4.180. Spanish 4.055. From Aschafenburg. Klapr.	Titan and Sauerstoff. Klaproth
Titanite, C. tetrahedral prism	Brown	3.510. des Passauischen. Klaproth	Titan-earth 33, silex 75, lime 33
	Yellow	3.450	Titan-earth 74, silex 8, lime 18
Nigrin, Menochroite, mid-oliplan	Oxyd of titan	4.445. Klaproth	Ol. titan 45, iron 51, silex 3, mang. 0.15,
	With iron in grains		Titan 84, iron 14, manganese 2. Klaproth
Grey Manganese, C. [illegible]	Foliating	4.395. Gellert	Manganese and sauerstoff. Karsten
	Grainy		Manganese and some silex. Klaproth
	Black friable		Mangan. 43, iron 43, lead 4 Wedgwood
	Iron-red tridenbayanegyag	3.238. Kirwan	Silex 35, iron 55, alumine 5. Ruprecht
[illegible]	White	6.538. Haüy 7.392. Wiedemann	
	Grey	6.3491. Haüy	Cobalt 46, arsenic 55, sulphr. 5. Klenaber Arsenic 49, cob. 20, iron 5, sul. 6. Tassaert
	[illegible]		Cobalt with acid of arsenic. Kirwan
	[illegible] of cobalt [illegible]		
	[illegible]	[illegible] Gellert	

Genus.	*Species and Variety.*	*Specific Gravity.*		*Component Parts.*
WISMUTH, *Bismuth*, C. octohedral. Form primitive.	Native	9.670		Bismuth
NICKEL-EARTH.		7.560.	Gellert.	Nickel, iron, arsenic, cobalt, sulphur. Bergmann
URANITE, C. thin rectangular straw-col'd plates.		7.5000.	Klaproth.	Uran 86, sulphuret of lead 6, iron 2, silex 5. Klaproth
URANGLIMMER.				Uran, sauerstoff, and a little copper. Klaproth
ANTIMONY, divisible paralelly to the faces of an octohedron. Haüy	Native	6.734.	Wiedemann	Antimony
	Grey			
	Feathery			
GREY ANTIMONY	Radiated	4.200.	Bergmann	Antim. 74, sulphur 26. Bergmann
	Hair-like			Antim. sulphur. iron, silver, silex. Bergm.
	Feathery			
ANTIMONY, C. tetrahedral rectangular laminæ in star-needles Roseller, 1787	Muriate weiss			
	Spiesglase			
TELLURIUM, laminar		6.115		Tellur. 9.25, iron 72, gold 0.20. Klaproth
	Native	5.723.	Haüy	Tellur. 60, gold 30, silver 10. Klaproth
	Lamelliform with gold and silver			

				Component Parts.
Tellurium, in prismatic needles	Graphic schrifterz with gold and lead	8.919		Gold 8, lead 50, tell. 33, sulphur 7, silver 1, with copper. Klaproth
	Yellow	10.678.	Kirwan ?	Gold 27, lead 19, tell. 45, silver 8, sulphur anatom
Blende	Yellow	4.044.	Gellert	Zink 64, sulphur 20, iron 5, fluoric acid 4, silex 1, alumine 5, water 6. Bergmann
	Brown	3.770.	Gellert	Zink 44, sulph. 17, iron 5, silex 24. alum. 5, water 3. Bergmann
	Black	3.967.	Gellert	Zink 45, sulphur 29, iron 9, lead 6, arsenic 1, silex 4, water 6. Bergmann
	Schaalige, of scaly texture			Zink 62, sulph. 21, lead 5, iron 3, arsenic 1, alumine 2, water 4. Hecht
Calamine, *Galmey*, oxyd of zink, C rectangular octohedral fig. 189, pl. 81. Haüy		3.871.	Wiedemann	Zink 84, sil. 1.12, iron 3, alum. 1. Bergmann
Zinespath				Zinc 65, carbon. acid 28, iron 5. Bergmann. See Tennant in Philos. Transact.

Genus.	*Species and Variety:*	*Specific Gravity.*		*Component Parts.*
COPPER, C. cube and octohedron, sulphuret crystallised in hexhedral prisms, truncated. Hauy. See his Plates.....	Native.....	7.728.	Gellert.....	.....
	.....	9.324.	Bergmann...	.....
	Malleable.....	.....		Copper 78, iron 2, sulphur 18, silex 0.25. Klaproth
	Foliated.....	.... :		Copper 56. sulphur. Klaproth
	Bunt versicolor...	5.467.	Wiedemann	Copper 63, sulph. 19, iron 12, Sauerstoff 4. Kl.
	Kies. Pyrites....	3.820.	Swedish.	Copper 36, with iron and sulphur. Kirwan
	.....		Muschenbroek	
	.....	4.160.	Freyberger	
	.....		Gellert	
	Red, foliated.....	3.950.	Wiedemann	.....
	Ruby earth and indurated.....	.....		Copper, sauerstoff and iron.
	Green and azure radiating.....	.....		Copper 68, carbon. acid 19, sauerstoff 9, water 2 Klaproth
	Malachite fibrous	.....		Cop. 58, car. ac. 18, sauerstoff 12, water 11. Kl.
	Compact.....	3.500.	Muschenb.	Copper 66, carb. acid 25, water 6. Gontana
	Fahlerz, grey copper with silver, and gold sometimes....	.....		Cop. 31, antim. 34, silver 14, iron 3, sul. 11. Kl.
	White.....	.....		C. 40, ars. & ir. between fahlerz and cop. pyrites
	Wood, copper. See Count Bournon, and Sowerby in tables. See Philosoph. Transact.			

Iron, C. cubes and octohedrons	Native			Iron
	Magnet-stone	4.447.	Common	
		3.300.	Fibrous	
	Iron-stone	4.195.	Wiedem.	Iron 80, sauerstoff 20, oxygene. Kirwan
	Shining-red	3.258.	Wiedemann	Iron, oxygene, and slate
	Ochry	2.932.	Wiedemann	
	Compact brown	3.873.	Wiedemann	Iron, oxygene, and manganese
	Ironglanz, specular compact and foliated	4.939 to 5.		
	Pyrites common	4.682.	Wiedemann	
	— magnetical	4.080.	Wiedemann	
	Actinose	4.729.	Wiedemann	
	Hairlike			
	Hepatic			
	Rasen, or sod iron stone or meadow	2.365.	Wiedemann	Iron and phosphoric acid, p. c. 30
	Spathose	3.784.	Gellert	Ironkalk 38, lime 38, mangan. 24. Bergm.
	Blue iron-stone crumbling			Iron, phosphoric acid
	Earthy			Ironkalk 43, silex 26, alumine 18, magn. 8, water 2. Vauquelin
		2.833.	Wiedemann	
		2.985.	Wiedemann.	
				Iron 53, alumine 24, sil. 19, magn. 4. Santi

Genus.	*Species and Variety.*	*Specific Gravity.*	*Component Parts.*
Thonartiger, Argillaceous iron stone..	Red	3.931. Blumenback	
	Barry	4.313. Wiedemann	
	Common	2.714. Wiedemann	
	Scaly	2.574. Wiedemann	
Menacanite			Iron 51, titan 45, silex 3, manganese 0.25. Klaproth
Titan-Iron			Iron 78, titan 22, Klaproth
Schmirgel, emery in grains of a light gray colour		3.922. Blumenback	
Lead-silver, weissgültigerz	Dark		Lead 41, antim. 21, silver 0.25, iron 1, sulphur 22, alumine 1, sil. 0.75. Klaproth
	Compact		Lead 48, silver 20, antim. 7, iron 2, sulph. 12, alumine 7, silex 0.25. Klaproth
Fahlerz, fallow-coloured earth		4.595. Wiedemann	Lead 34, antim. 16, copper 16. iron 13, silver 2, sulphur 10, silex 2. Klaproth
Lead Bismuth, wismuth-bley			Lead 33, wismuth 27, silver 15, iron 4, sulph. 16, copper 0.90. Klapr.
Bley-Glanz, potters lead-ore	Würfliger cubic...	7.290 Gellert	Lead 83, sulphur 16, with a little silver. Westrumb.
	Compact	7.444. Gellert	
	Bleischweif		
Bley-vitriol, vitriol of lead, C. octohedral			Lead and sulphur. acid. Klaproth
Hornbley			Lead 55, salzsäure 45. Klaproth
Blue-lead-earth			Lead and phosphor. acid. Klaproth

hedral. 2 pyramids. Haüy. pl. 58. fig. 59.		6.974. Wiedemann	Lead and phosphoric acid. Klaproth
Green.			
Yellow		6.076. Brisson.	Lead 73, phosphoric acid 18, iron 17. Klaproth
Red		5.880. Wiedemann	Lead 58, molybden acid 38, iron 3.
Blev-Niere, kidney-lead		6.026. Blumenb.	Lead 63, chrome acid 36. Vauquelin. Hatchett
White-lead-earth			Lead 35, arsenic acid 25, iron 14, silver 1.50, silex 7, alum. 3, water 10. Bindheim
Tin, *Tin Pyrites, zinnkies*		4.493. Westrumb.	Lead 80, carbonic acid 16, iron, alumine, lime. Westrumb.
Zinnstein, oxyd of tin, *C.* a cube, fig. 176, pl. 79. Hauy.		4.350. Klaproth.	Tin 34, copper 36, iron 2, sulph. 25. Kl.
Fibrous Wood tin		6.300. Gellert. 6.9348. Haüy.	Tin 77, oxygene, iron, and silex 22. Klapr.
Native Quicksilver		6.450. Klaproth.	Tin 63, iron and arsenic. Klaproth
Amalgam		14.114. Muschenb. 13.581. Haüy.	Quicksilver
			Quicksilver 64, silver 36. Klaproth

Genus.	*Species and Variety.*	*Specific Gravity.*		*Component Parts.*
Horn Quicksilver...	.....	.....	.....	Quicksilver 70, salzsaüre and sulphuric acid. Kirwan
Leberz, native oxyd of quicksilver.....	Compact.....	7.937.	Gellert.....	Quicksilver and sulphur
Cinnabar, C. tetrahedral prism, hexhedral, form prim. fig. 27, pl. 65. Haüy	Dark red.....	4.595. 7.300.	Gellert..... Muschenb...	Quicksilver 80, sulphur 20
Silver, native C. cubic octohedral..	.....	10. 10.157. 11.091.	Gellert..... Brisson..... Muschenb.	....
Silver.....	Güldisch.....	.....		Silver 72, gold 28. Fordyce
	Black.....	.....		.....
	Horn.....	4.804.	Gellert.....	Silver 67, muriatic acid with a little sulph. 25, iron 6. Klaproth
	Brittle, vitreous...	7.208.	Gellert.....	Silver 66, sulphur 12, antimony 10, iron 5, a little copper and arsenic. Klaproth
	Vitreous.....	7.215.	Gellert.....	.....
	Antimonial.....	10.	Selb.....	Silver 80, antimony 20. Klaproth
C. in acute double hexedral pyramids, the dark with tetrahedral pyramids...	Red, dark, and light coloured...	5.608.	Gellert.....	Silver 60, antimony 20, sulphur 14, oxygene 5. Klaproth

			Component Parts.
Gold, C. octohedral tetrahedral cubic...	Native	19.258. Brisson....	.....
		19.640. Muschenb.	.....
	Messingelbes.	.....	Gold and silver. Electrum
	Fahlgelbes.....		
	Grey gold..	8.919.....	Sulphur 41, lead 25, iron 16, gold 11, silver 2, arsenic 1, oxyd antimony 2
	White.....	5.723.....	Gold in union with a new metal, arsenic, and nickel. Muller
Platina in grains and lumps.....	Native.....	20.722. Klaproth	.....
		20.833. Gruyton ...	.....
		23. Kirwan	.....

INDEX

OF MINERALS,

AND THEIR PLACES.

GENUS.—LIME.

Pure lime, or uncombined calcareous earth, *Bath, Upper Auvergne.*

Calcareous spar, *Cumberland, Derbyshire.*

Stalactites, flosferri, pisolite, roestone, *Derbyshire; Stiria, Carlsbad.*

Marble of iridescent shells, *Bleyberg* in *Carinthia.*

Chalk, *Kent.*

—— Yellow with black arborisations, *Tuscany.*

Swine-stone, *Sweden—Portugal.*

Pearl-spar, *Hartz—Schemnitz.*

Bitter-spar, *Zillerthal—Tyrol.*

Argentine schistous spar, *Schwarenberg—Konsberg.*

Dolomite, *Mount St. Gothard—Malaga.*
Fluor spar, *Cumberland—Derbyshire.*
Apatit, *Ebenfriedensdorf—Spain,* and *Hungary.*
Gypsum, *Oxfordshire—Shotover-hill.*

Genus.—Strontian.

Strontian, *Strontian.*

Genus.—Baryt.

Baryt carbonate, *Anglesark.*
Sulphate. *Bristol—Ryegate Fuller's-earth-Pits.*
Liver-stone, *Konsberg.*

Genus.—Magnesia.

Magnesia, *Thionville.*
Meerschaum, *Burza, Turkey.*
Talc, *Zillerthal.*
Pot-stone, *Como—Milan.*
Soap-rock, *Cornwall—China.*
Serpentine, *Zöplitz, Saxony.*
Chlorite, *Corsica—Cornwall.*
Asbestos, *Scotland—Danemora, Sweden.*
Amianthus, *Dauphiny.*
Mountain cork, *Persia—Bohemia.*

nolite, *Scotland.*
China—South-Sea Islands.
lite, *Siberia.*
ite, *Luneburg, Hanover.*

GENUS.—ARGILL.

-carbonate, *Halle—Magdebourg.*
with silver mica, *Cornwall.*
marga, *Saltzbourg.*
's-earth, *Ryegate.*
Armenia.
i, *Africa.*
olite, *Tyrol.*
te, *Zillerthal.*
Ehrenfriedensdorf.
elle, *Altenberg.*
lende, *Scotland.*
———Resplendent, *Labrador.*
, *Antrim Monte.*
y rag, *Bolca—Staffordshire.*
Dublin.
Saxony, Scotland.
ulite, *Turkey.*
: allum, *Stahlberg—Sicily.*

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Topaz of Brazil, *Brazil.*
—— of Saxony, *Schnekenstein—Voightland.*
Beryl of Siberia, *Salthsen-Eybenstock.*
Spinell-Balais ruby, *Ceylon—Brazil.*
Emerald in calp, *Peru.*
Aqua marina, *Siberia.*
Chrisolite, *East Indies.*
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Garnet, *Hungary—Bohemia.*
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Schorlite, *Altenberg.*
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Calcedony, *Cornwall.*
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—— dendritic, *Norfolk.*
Hornstone, *Deva—Derbyshire.*
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Ædelite, *Adlefors.*
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GENUS VIII.

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METALS.

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..... II.—Gold, *South America—Hungary.*
..... III.—Silver, *Konsberg—Potosi.*

ORDER II.

Mercury, *Idria.*

ORDER III.

GENUS I.—Lead, native, *Brittany—Monmouthshire.*
..... II.—Nickel, *Joachimstal—Bohemia.*
..... III.—Copper, *Cornwall.*
..... IV.—Iron, native, *Dauphiny—Eibenstock, Saxony.*
..... —Tin, *Cornwall.*

GENUS VI.—Zinc, *Derbyshire—Wales.*
..... VII.—Bismuth, *Schneeberg.*
..... VIII.—Cobalt, *Marienberg.*
..... IX.—Arsenic, *Hartz.*
..... X.—Manganese, *Ilefeld—Germany.*
..... XI.—Antimony, *Salberg.*
..... XII.—Uranium, *Johngeorgenstadt.*
..... XIII.—Molybdena, *Scotland.*
..... XIV.—Titanium, *Menachan.*
..... XV.—Scheelin, *Bohemia.*
..... XVI.—Tellurium, *Nagyag.*
..... XVII.—Chrome, *Siberia.*

Tantalium, new metal found in gadolinite.
Palladium, found in platina.
Iridium, in Platina.
Osmium, in platina.
Rhodium in crude platina.
Cererium, in a mineral.
Columbium, in a mineral.

THE END.

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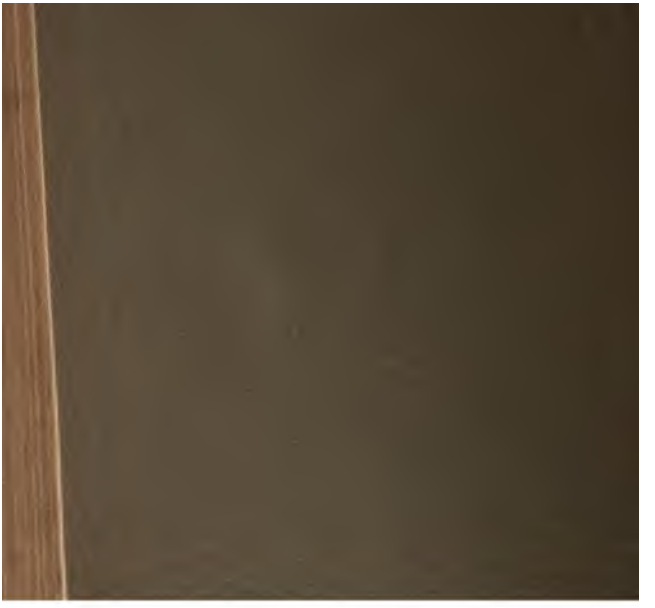
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